U.S. DEPARTMENT OF COMMERCE
National Technical Information Service

PB-260 341

WATER ORIENTED OUTDOOR RECREATION, LAKE ERIE BASIN

Bureau of Outdoor Recreation
Ann Arbor, Michigan

August 1966

215179

PB 260 341

WATER ORIENTED OUTDOOR RECREATION

LAKE ERIE BASIN

U.S. DEPARTMENT OF THE INTERIOR

BUREAU OF OUTDOOR RECREATION

Lake Central Region Ann Arbor, Mich.

AUGUST 1966

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U. S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

BIBLIOGRAPHIC DATA SHEET	1. Report No.	2.	3. Recipient's Accession No. PB-260 341
4. Title and Subtitle Water Oriented Outdoor Recreation, Lake Erie Basin.			5. Report Date Aug 66
			6.
7. Author(s)			8. Performing Organization Rept. No.
9. Performing Organization Name and Address Bureau of Outdoor Recreation, Ann Arbor, Mich. Lake Central Regional Office.			10. Project/Task/Work Unit No.
			11. Contract/Grant No.
12. Sponsoring Organization Name and Address			13. Type of Report & Period Covered
			14.

15. Supplementary Notes

16. Abstracts

The outdoor recreational aspects of the Lake Erie-Lake St. Clair Basin are reported. Although the area is a focal point for outdoor recreation, pollution of the water and aesthetic degradation of the shoreline are major deterrents to the full utilization of the recreation resource. Needs and goals for lands and development are reviewed, along with suggested programs for continuing surveys and studies. Appended are an inventory of existing recreation areas, a bibliography, views of cooperating agencies, and the methodology for estimating demand and for determining acreage needs.

17. Key Words and Document Analysis. 17a. Descriptors

17b. Identifiers/Open-Ended Terms

*Recreation
*Water quality data
Lake Erie
Lake St. Clair
Land use
Water pollution effects(Plants)
Water pollution effects(Humans)
Tables(Data)
Fishes

17c. COSATI Field/Group 13B

18. Availability Statement	19. Security Class (This Report) UNCLASSIFIED	21. No. of Pages 170
	20. Security Class (This Page UNCLASSIFIED	22. Price

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF OUTDOOR RECREATION
LAKE CENTRAL REGION
3853 RESEARCH PARK DRIVE
ANN ARBOR, MICHIGAN 48104

IN REPLY REFER TO:
D6427GL

August 30, 1966

William Q. Kehr, Project Director
Great Lakes-Illinois River Basins Project
Federal Water Pollution Control Administration
Great Lakes Region
1819 West Pershing Road
Chicago, Illinois 60606

Dear Mr. Kehr:

Enclosed is a report on the outdoor recreational aspects of the Lake Erie-Lake St. Clair Basin. The report has been prepared under basic authorization contained in Public Law 88-29, 88th Congress, enacted May 28, 1963, and in response to your request for our participation in the Great Lakes-Illinois River Basins Project.

It is apparent from this study that Lake Erie, Lake St. Clair, inland lakes, and streams of the Basin are a focal point for outdoor recreation. Presently, 9.8 million people reside in the Basin proper, and this number is expected to more than double in the next fifty years. The majority of the Basin's population is concentrated along the shoreline of Lakes Erie and St. Clair. The juxtaposition of people and of water resources lends emphasis to the need for effective planning and development to preserve and to utilize the recreation potential inherent to the Basin.

By virtue of being southernmost of the Great Lakes and other favorable factors such as climate and water temperature, Lake Erie is conducive to water contact recreation for a longer period of the summer as compared to the other Great Lakes. Where access and facilities for recreation at water bodies are provided, the public in most cases makes full use of the opportunities.

There are, however, unfavorable conditions which counter proper development of the recreation potential of the Basin's water resources. Pollution of the water and aesthetic degradation of the shoreline are major deterrents to the full utilization of the recreation resource. Directly, local adverse water quality has (1) inhibited use of many developed recreation areas, (2) resulted in abandonment of recreation developments, and (3) discouraged development of new recreation units. Indirectly, the general knowledge that water quality problems exist locally in Lake Erie and tributary waters probably casts a dark shadow that the public erroneously relates to the entire system or nearly so.

A broad analysis of the influence of poor water quality upon the single activity of swimming was made to establish an indication of the value to recreation of pollution control. It is estimated that control of pollution in presently affected areas would increase swimming by six million activity days annually. Since future demand for swimming will multiply significantly, it is evident that improved water quality in the Lake Erie Basin is most important to public enjoyment of this recreation activity.

As a result of our study and as reported in the attached substantiating document, the following conclusions are made:

1. By the year 2000, recreation demands in the Basin will more than triple for most activities.

2. The United States portion of the Lake Erie shore has few good sand beaches and adequate natural harbors for water-dependent activities.

3. The Basin lacks inland lakes suitable for water-oriented outdoor recreation activities. Presently, there is less than one-hundredth of an acre of inland lake water per Basin inhabitant.

4. Day use water-oriented recreational facilities which serve the SMSA (Standard Metropolitan Statistical Area) counties of the Basin are critically lacking.

5. Relating expansion of existing facilities and creation of new areas to projected demands, it appears probable that shortages of recreation areas will continue to grow. Among the paramount factors causing the present situation are: (a) poor water quality in and adjacent to the metropolitan centers of the Basin, (b) lack of public access to water for recreational use, and (c) inadequate funds to plan, acquire, and develop needed facilities.

6. Industrial and domestic pollutants have contaminated portions of Lake Erie and several rivers within the Basin to the extent that their recreational value has been impaired.

7. In some instances, recreationists who have year around homes, which were formerly used as summer cottages, along the shores of water bodies in the Basin contribute to water quality deterioration through overloading sanitation facilities. In addition, litter scattered around recreational areas has weakened the aesthetic quality of many sites.

8. The greatest natural resource asset of the Basin from a recreational standpoint is Lake Erie and its adjacent shoreline. Less than ten percent of the lake shoreline has been acquired for all types of public recreational use.

In consideration of the conclusions and information contained in the supporting report, the following recommendations are made:

1. Through the leadership of the Federal Water Pollution Control Administration all government agencies which administer recreational lands and waters should assess their individual situations and adopt strong programs of pollution prevention and abatement. Once this is accomplished, other governmental agencies, industry and private organizations that use water resources should be encouraged to develop and to implement pollution prevention and abatement programs. Direct measures to prevent and to abate the sources of pollution rather than dilution methods are more effective in improving the quality of water for recreational use.

2. Water quality criteria should be adopted and used by the agencies directly concerned with the local public health to assure that the quality of water is suitable for the various types of water-oriented recreation engaged in. Where such waters do not meet required criteria, the public should be repeatedly warned through posting and news media. To aid in the effective use of the criteria, a quick reliable, inexpensive test for determining water quality of bathing beaches should be devised.

3. Comprehensive planning for the development of the Great Lakes shoreline should be undertaken. Such planning should be under the direction of an agency having broad responsibilities in the field of planning. (A River Basin Commission established under the Water Resources Planning Act of 1965, Public Law 89-80, or another agency especially established for the purpose, may be appropriate.) In conjunction with such planning, water quality should be given full consideration; multiple use of lands and waters should be proposed where feasible; an inventory of the shoreline should be carried out on all bodies of water within the Basin as a basis for classification; and based on such classification and previously established criteria, water quality goals for contiguous water should be established. As a further adjunct to such planning, it is felt consideration should be given to possible public acquisition of shoreline areas which have deterioriated economically and/or pose special problems with respect to shoreline erosion or flooding. Such areas could be developed for public access and use.

4. Control should be exercised over the degradation of our water and other recreational resources through the promulgation

of laws and regulations for their protection. Such laws and regulations should include zoning regulations, employed to protect waters from pollution and other misuse; revision of ownership liability laws to further encourage industrial and other private owners of lands having recreational value to permit public use of such lands thereby relieving the use pressure on public lands; and legislation to control effluent disposal into open waters from recreation watercraft. In this connection, provision should be made for the convenient disposal of wastes and litter in an acceptable manner by the public, especially for on-shore disposal at launching sites and marinas by recreational boaters.

5. An accelerated educational appeal should be made to the public concerning their role in the protection of waters from pollution. Perhaps an aquatic animated character could be ingeniously conceived similar to the philosophy that "Smokey the Bear" is nationally recognized as the champion of forest fire prevention.

6. Further research should be conducted on the many aspects of the relationship between water-oriented outdoor recreation activities and water quality. Such a research project might reveal the effects of various levels of use for a selected water-oriented facility upon water quality aspects of the water resource.

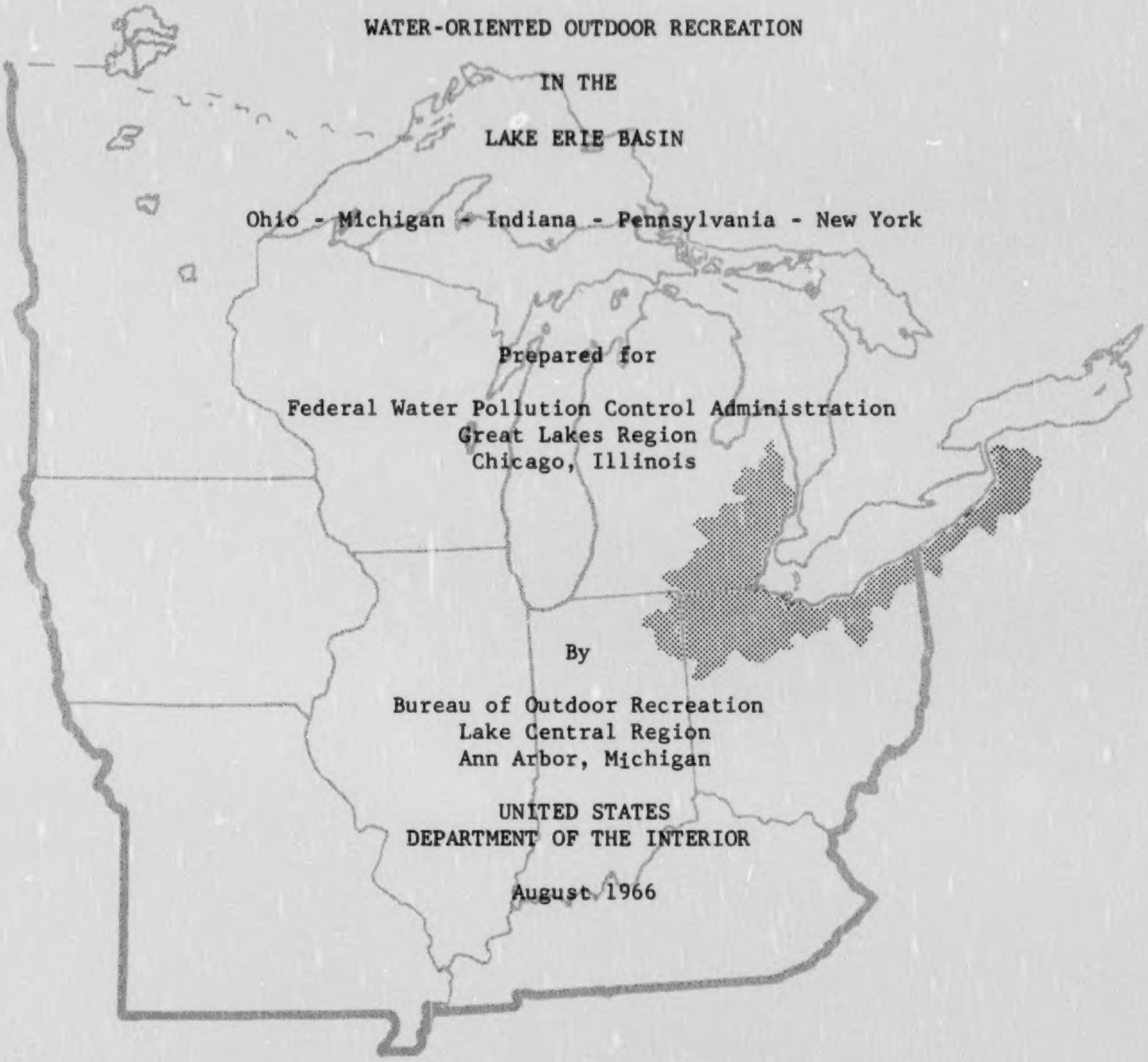
In some instances, action has been initiated by agencies or groups concerning the above recommendations. This office has noted a considerable increase in activities which should lead to such implementation by responsible agencies just since the study leading to this report was undertaken.

Sincerely yours,

Roman H. Koenings

Roman H. Koenings
Regional Director

Enclosure



WATER-ORIENTED OUTDOOR RECREATION
IN THE
LAKE ERIE BASIN

Ohio - Michigan - Indiana - Pennsylvania - New York

Prepared for

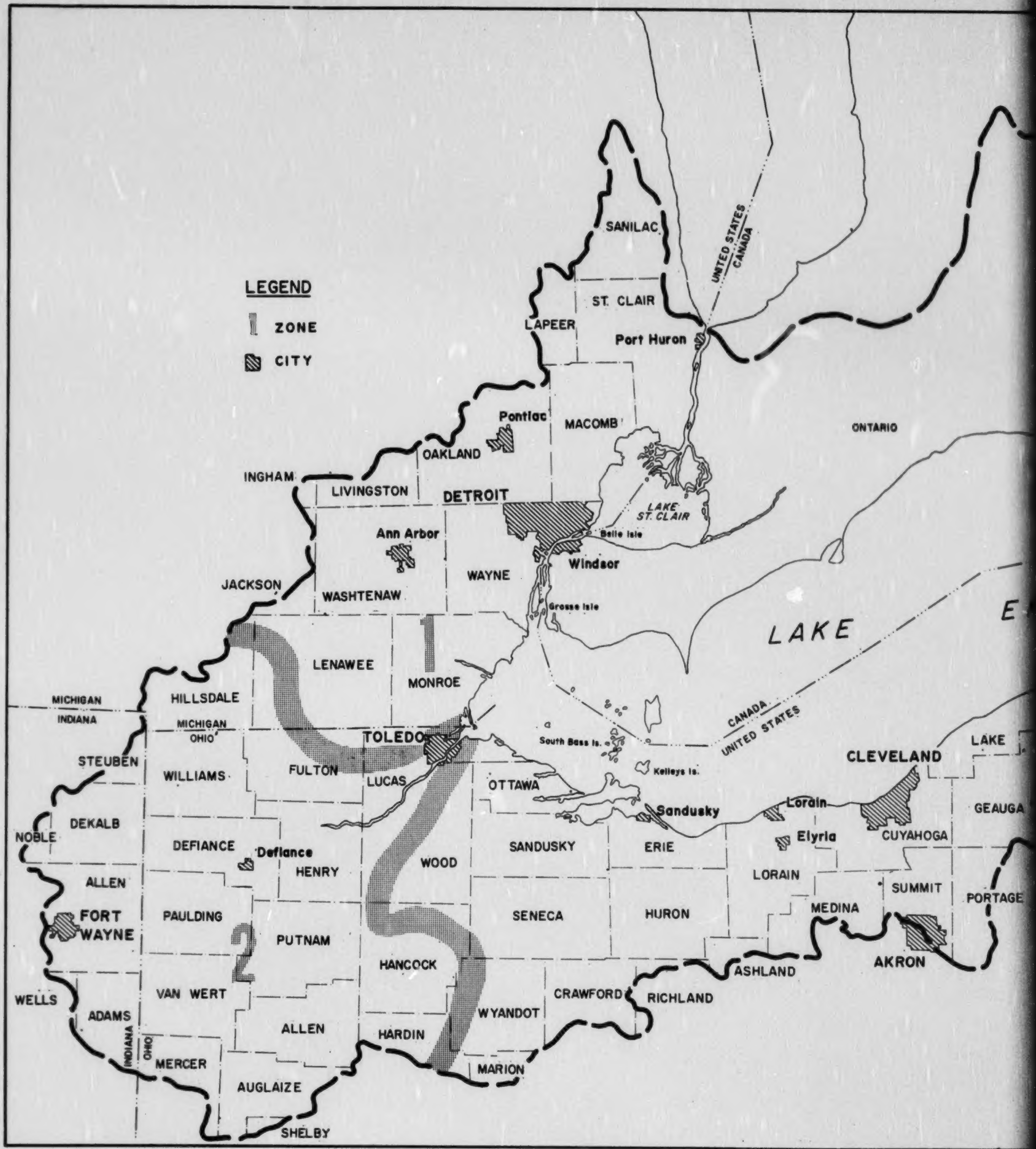
Federal Water Pollution Control Administration
Great Lakes Region
Chicago, Illinois

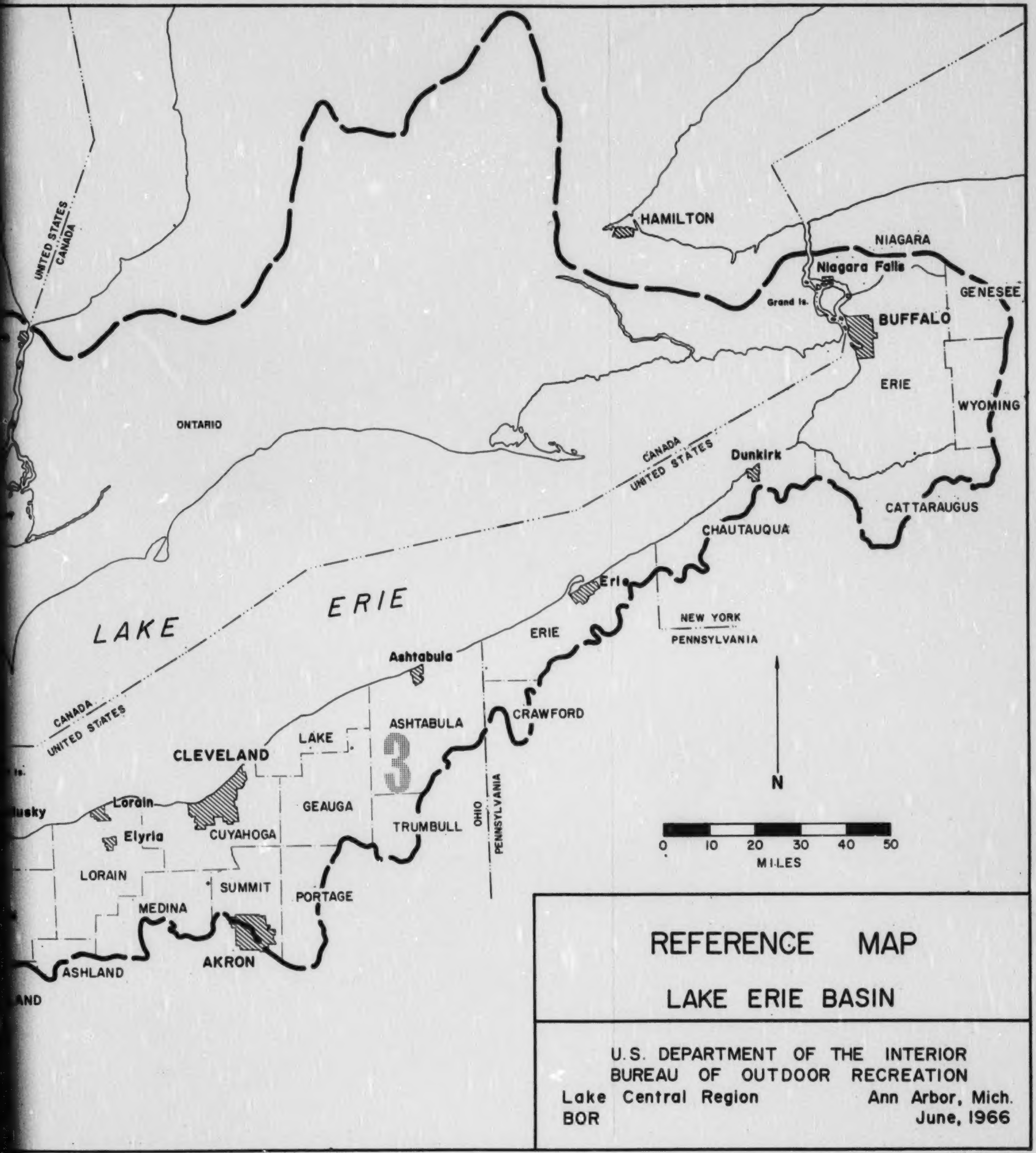
By

Bureau of Outdoor Recreation
Lake Central Region
Ann Arbor, Michigan

UNITED STATES
DEPARTMENT OF THE INTERIOR

August 1966


LEGEND
1 ZONE
▨ CITY
SANILAC
ST. CLAIR
LAPEER
Port Huron
UNITED STATES
CANADA
Pontiac
MACOMB
OAKLAND
ONTARIO
INGHAM
LIVINGSTON
DETROIT
LAKE ST. CLAIR
Belle Isle
Ann Arbor
Windsor
WAYNE
JACKSON
WASHTENAW
Grosse Isle
LAKE
E
1
LENAWEE
MONROE
MICHIGAN
INDIANA
HILLSDALE
MICHIGAN
OHIO
TOLEDO
South Bass Is.
CANADA
UNITED STATES
LAKE
CLEVELAND
STEUBEN
WILLIAMS
FULTON
LUCAS
OTTAWA
Kelleys Is.
Sandusky
Lorain
GEAUGA
DEKALB
NOBLE
DEFIANCE
Defiance
HENRY
WOOD
SANDUSKY
ERIE
Elyria
CUYAHOGA
ALLEN
LORAIN
SUMMIT
FORT WAYNE
PAULDING
PUTNAM
SENECA
HURON
MEDINA
PORTAGE
2
HANCOCK
ASHLAND
AKRON
WELLS
VAN WERT
CRAWFORD
RICHLAND
WYANDOT
ADAMS
ALLEN
HARDIN
INDIANA
OHIO
MERCER
MARION
AUGLAIZE
SHELBY


UNITED STATES
CANADA
ONTARIO
HAMILTON
NIAGARA
Niagara Falls
Grand Is.
GENESEE
BUFFALO
ERIE
WYOMING
CANADA
UNITED STATES
Dunkirk
CATTARAUGUS
CHAUTAUQUA
LAKE
ERIE
Erie
NEW YORK
PENNSYLVANIA
ERIE
Ashtabula
CRAWFORD
CANADA
UNITED STATES
ASHTABULA
LAKE
CLEVELAND
GEAUGA
TRUMBULL
OHIO
PENNSYLVANIA
N
lusky
Lorain
Elyria
CUYAHOGA
LORAIN
SUMMIT
PORTAGE
MEDINA
AKRON
ASHLAND
AND
0
10
20
30
40
50
MILES

REFERENCE MAP

LAKE ERIE BASIN

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF OUTDOOR RECREATION
Lake Central Region Ann Arbor, Mich.
BOR June, 1966

Frontispiece

FOREWORD

"For centuries Americans have drawn strength and inspiration from the beauty of our country . . . uncontrolled waste products are menacing the world we live in, our enjoyment and our health. The air we breathe, our water, our soil and wildlife, are being blighted . . . The same society which receives the rewards of technology, must, as a cooperating whole, take responsibility for control.

"To deal with these new problems will require a new conservation . . . In this conservation, the protection and enhancement of man's opportunity to be in contact with beauty must play a major role.

"This means that beauty must not be just a holiday treat, but a part of our daily life . . . Beauty is not an easy thing to measure . . . Waterways that were once sources of pleasure and beauty and recreation are forbidden to human contact and objectionable to sight and smell . . . The beauty of our land is a natural resource . . . We must rescue our . . . countryside from blight with the same purposes and vigor with which, in other areas, we moved to save the forests and the soil."

From: Lyndon B. Johnson, Special Message on Natural Beauty of Our Country to the Congress of the United States, February 8, 1965.

ACKNOWLEDGEMENTS

The compilation of information contained in this report would not have been possible without the full cooperation of a large number of agencies and individuals. Agencies assisting include: U.S. Public Health Service; Bureau of Commercial Fisheries; Bureau of Sport Fisheries and Wildlife; National Park Service; Federal Water Pollution Control Administration; Soil Conservation Service; U.S. Army Corps of Engineers, Buffalo, Detroit and Lake Survey Districts; Weather Bureau; Bureau of Public Roads; Forest Experiment Stations in Columbus, Ohio, and St. Paul, Minnesota; Forest Service, Region 9; Economic Research Service; Great Lakes Commission; National Association of Soil and Water Conservation Districts; Indiana State Agricultural Extension Service, Purdue University; Indiana Department of Conservation; Michigan Department of Conservation; Michigan Department of Health; Michigan State Highway Department; Michigan State University; Michigan Tourist Council; Michigan Water Resources Commission; University of Michigan; Huron-Clinton Metropolitan Authority, Detroit, Michigan; St. Clair Regional Planning Commission, Port Huron, Michigan; *Ann Arbor News*, Ann Arbor, Michigan; *Monroe Evening News*, Monroe, Michigan; Genesse County, New York, Health Department; Erie County, New York, Health Department; Chautauqua County, New York, Planning Board; Cattaraugus County, New York, Extension Service; Erie County, New York, Planning Department; Erie County, New York, Department of Parks and Recreation; New York State Agricultural Extension Service, Cornell University; New York State Conservation Department; Niagara Frontier State Park Commission, New York; Niagara County, New York, Health Department; Niagara County, New York, Industrial Development and Planning Commission; Ohio State Agricultural Extension Service; Ohio Department of Natural Resources; Tri County Regional Planning Commission, Akron, Ohio; Cleveland Metropolitan Park District, Ohio; Regional Planning Commission, Cleveland Ohio; Ashtabula County Planning Commission, Jefferson, Ohio; Lake County Planning Commission, Painesville, Ohio; Geauga County Planning Commission, Ohio; Lorain County Regional Planning Commission, Ohio; *Cleveland Plain Dealer*, Cleveland, Ohio; Personnel, Presque Isle State Park, Erie, Pennsylvania; Erie County; Pennsylvania, Planning Commission; National Recreation and Park Association; and Outboard Motor Club of America.

Though the people of the above named agencies who gave of their time to furnish the information upon which this report is based are too numerous to acknowledge individually, their efforts were appreciated by this Bureau.

TABLE OF CONTENTS

	Page
REFERENCE MAP LAKE ERIE BASIN	Frontispiece
FOREWORD	i
ACKNOWLEDGEMENTS	ii
TABLE OF CONTENTS	iii
Index of Tables	v
Index of Plates	vi
INTRODUCTION	1- 1
Authorization	1- 1
Purpose	1- 1
Scope	1- 1
Problems and Limitations	1- 2
Definitions	1- 2
SUMMARY	2- 1
PHYSICAL ASPECTS OF THE BASIN	3- 1
Location and Extent	3- 1
Climate	3- 2
The Land	3- 5
Land Use	3- 7
The Water	3-10
THE PEOPLE	4- 1
Resident Population	4- 1
Economic Characteristics	4- 6
Visiting Population	4-11
DEMAND FOR OUTDOOR RECREATION	5- 1
Factors Affecting Demand	5- 1
Present Demand	5- 2
Projected Demand	5- 4
Zone Demands	5- 7
SUPPLY OF OUTDOOR RECREATION	6- 1
Recreation Resources	6- 1
Existing Recreation Areas	6- 2
Swimming and Swimming Areas	6- 6
Boating and Boating Areas	6- 7
Canoeing	6-14
Sailing	6-14
Fishing and Fishing Areas	6-16
Other Activities	6-16
Private Recreation Development	6-18

TABLE OF CONTENTS
(Continued)

Page

PROPOSED AND POTENTIAL RECREATION AREAS 7- 1

NEEDS AND GOALS FOR LANDS AND DEVELOPMENT 8- 1
    General 8- 1
    Present Needs 8- 1
    Future Needs 8- 3
    Goals 8- 5
    Federal Assistance 8- 8

WATER QUALITY INFLUENCES 9- 1
    General Situation 9- 1
    Water Quality Influences on Swimming 9- 1
    Water Quality Influences on Boating and Associated Activities 9-10
    Water Quality Influences on Fishing 9-13
    Other Adverse Effects of Poor Water Quality 9-13

NEEDS,GOALS AND PROGRAMS FOR CONTINUING SURVEYS AND STUDIES 10- 1

APPENDIXES

    A. INVENTORY OF EXISTING RECREATION AREAS

    B. BIBLIOGRAPHY

    C. VIEWS OF COOPERATING AGENCIES

    D. METHODOLOGY
        Methodology for Estimating Demand for Recreational Opportunities
        Method for Determining Acreage Needs

INDEX OF TABLES

		Page
Table No. 3-1	The Lake Erie Basin & Land Area Components	3- 2
Table No. 3-2	Land Use in the Lake Erie Basin	3- 9
Table No. 3-3	Lake Erie-St. Clair Shore	3-13
Table No. 3-4	Inventory of Inland Lakes in the Lake Erie Basin	3-14
Table No. 3-5	Major Watersheds of the Lake Erie Basin	3-20
Table No. 4-1	Comparison of Nation-Basin Automobiles Per Capita and Interstate Miles	4- 9
Table No. 5-1	Summary of Present Water-Oriented Recreational Activities - Lake Erie Basin	5- 4
Table No. 5-2	Present Demand for Selected Water-Oriented Outdoor Recreational Activities - Lake Erie Basin	5- 5
Table No. 5-3	Expected Summer (June, July, August) Participation in Selected Water-Oriented Activities in 2000 and 2020 - Lake Erie Basin	5- 6
Table No. 5-4	Summary of Zone Demands	5- 7
Table No. 6-1	Supply Summary - Lake Erie Basin	6- 3
Table No. 6-2	Recreational Harbors - Lake Erie Basin	6-12
Table No. 6-3	Distribution of Private Group Camps	6-24
Table No. 6-4	Distribution of Private Campgrounds	6-24
Table No. 7-1	Proposed Recreational Areas - Lake Erie Basin	7- 3
Table No. 7-2	Proposed Expansions for Existing Recreational Areas	7- 7
Table No. 8-1	Present Public Acreage Needs - Lake Erie Basin	8- 4
Table No. 8-2	Public Acreage Needs by 2020 - Lake Erie Basin	8- 4
Table No. 9-1	Comparison of Attendance Records at Sterling State Park	9- 6
Table No. 9-2	Projected Attendance Losses at Sterling State Park, Michigan Without Improved Water Quality	9- 7
Table No. 9-3	Estimated Influence of Water Quality of Swimming Activity at Public Beaches - Lake Erie Basin	9- 9

INDEX OF PLATES

		Page
Reference Map		Frontispiece
Plate No. 2-1	Heavily Used Public Bathing Beach	2- 3
Plate No. 3-1	Shoreline Recreation Climate	3- 3
Plate No. 3-2	Shore Types and Land Form	3- 6
Plate No. 3-3	General Land Use Pattern	3- 8
Plate No. 3-4	Eroded Shore and Developed Shore on Lake Erie	3-12
Plate No. 3-5	Drainage	3-19
Plate No. 4-1	Population Distribution - 1960	4- 2
Plate No. 4-2	Comparison of Land Area and Population by Zone	4- 3
Plate No. 4-3	Rates of Population Change by Zone	4- 4
Plate No. 4-4	Urban Population Distribution Northeastern United States	4- 5
Plate No. 4-5	Interstate Highway System	4-10
Plate No. 4-6	Income, Travel and Leisure Factors Affecting Use of Outdoor Recreation Facilities, 1850-2000	4-12
Plate No. 5-1	Water Skiing	5- 3
Plate No. 6-1	Existing Federal and State Recreation Areas	6- 4
Plate No. 6-2	Existing Local Recreation Areas	6- 5
Plate No. 6-3	Boating Activities	6- 8
Plate No. 6-4	Boat Launching Ramp	6-10
Plate No. 6-5	Recreation Harbors	6-11
Plate No. 6-6	Memorial Park Marina	6-13
Plate No. 6-7	Sailing	6-15
Plate No. 6-8	Pier Fishing	6-17
Plate No. 6-9	Ice Fishing	6-19

INDEX OF PLATES
(Continued)

		Page
Plate No. 6-10	Cedar Point Recreation Area, Ohio	6-20
Plate No. 6-11	Private Group Camps	6-22
Plate No. 6-12	Private Campgrounds	6-23
Plate No. 7-1	Proposed New Recreation Areas	7- 2
Plate No. 8-1	Effects of Over Use	8- 2
Plate No. 9-1	Children Playing on Beach	9- 2
Plate No. 9-2	Posted Beach	9- 4
Plate No. 9-3	Bathing at Sterling State Park, Michigan	9- 5
Plate No. 9-4	Ann Arbor, Michigan Municipal Beach	9- 8
Plate No. 9-5	Factors Influencing Boating	9-11
Plate No. 9-6	Factors Influencing Shore Use	9.12
Plate No. 9-7	Recreationists Influence Water Quality	9-14
Plate No. 9-8	Areas of Water Recreation Impairment	9-16

INTRODUCTION

Authorization

Water-Oriented Outdoor Recreation in the Lake Erie Basin was prepared by the Lake Central Region, Bureau of Outdoor Recreation, Department of the Interior, at the request of William Q. Kehr, Project Director, Great Lakes-Illinois River Basins Project, Great Lakes Region, Federal Water Pollution Control Administration, Department of the Interior by letter of July 15, 1963. The Bureau of Outdoor Recreation made the study under basic authorization contained in Public Law 88-29, 88th Congress enacted May 28, 1963.

Purpose

This report serves as an appendix to the Lake Erie portion of the Great Lakes-Illinois River Basin Comprehensive Study conducted by the Federal Water Pollution Control Administration. The purpose of the study is to (1) inventory existing recreation areas, (2) establish goals for meeting outdoor recreation needs within the basin, (3) identify potential recreation areas, (4) discuss water quality influences on present and future outdoor recreation use and (5) recommend action and/or programs to improve the basin's water recreation opportunities both now and in the future. The accomplishment of the above purposes will facilitate the development of water quality goals with respect to water recreation and will serve to emphasize the urgent need for measures for the prevention of pollution and control of water quality in present and potential recreation areas.

Scope

This report considers only recreation within the United States portion of the Lake Erie Basin. The Lake Erie Basin for purposes of this study includes the St. Clair River, Lake St. Clair, the Detroit River and portions of the Niagara River and their tributaries in addition to the basin proper. The limits of the basin are graphically portrayed on the frontispiece. A modified recreation market area* was adopted for use in this study for the following reasons: (1) much of the area that would be considered a recreation market area for the Lake Erie Basin is included in studies covering each of the other Great Lakes Basins and (2) it was found so many additional areas would need to be considered that valuable time and space would be devoted to duplication of them in each report at the expense of basin area evaluation. Hence, the existing and potential water recreation resources in the belt around the basin were not considered. However, in developing the modified recreation market area, the influence of people outside of the basin on recreation demand within it was considered. This outside influence was represented through calculation of the influence of the population of Standard Metropolitan Statistical Areas (SMSA's) within a 125 mile radius of the basin on the recreation demand in it.

* Definition on page 1-2 of this report.

An inventory of recreation areas administered by the Federal Government, the various state agencies, county, township and city governments is herein contained. It is based on information obtained for the Nationwide Plan being prepared by this Bureau. The emphasis is placed on such recreation areas as public camping areas, public beaches, the larger marinas on Lake Erie, ski resorts and group camps collectively by counties. No attempt is made to evaluate such urban recreation facilities as swimming pools, golf courses, children's playgrounds, amusement parks and city parks that do not provide facilities for water-oriented or camping recreation. An estimation is made of present use. Projected use is estimated by considering existing, proposed and potential area development and their capacity to satisfy a projected demand. Certain areas where low water quality has had significant impact to limit recreation use are discussed.

Problems and Limitations

By using a watershed boundary as the limit of measurement, it was found that much extrapolating was necessary as most existing data is on a state or county basis.

There are commonly agreed upon standards and criteria to employ in assessing the adequacy of recreation facilities either as to quantity or quality. Water quality standards, as they apply to recreation, vary considerably between agencies responsible for determining whether certain types of water-oriented recreation will be permitted. 44/* Some beaches are permitted to remain open though the water quality may be lower than that at other beaches which have been closed by another agency.

Estimating future recreation demand or use was particularly vexing because desired statistical information was lacking or incomplete. It was necessary, therefore, to use judgements based on weighted values in the absence of such desired statistical information. Such judgements were based on the best available data.

Most of this report was completed before the comprehensive outdoor recreation plans of each of the states in the Lake Erie Basin became available. However, during intra-office coordination, the report was reviewed by personnel familiar with such state plans as were available to determine the compatability of the report with these plans. Based on this review and comments received from interested agencies, it is felt the report is compatible with the recreation plans of states in the basin.

Definitions

The following definitions are applied to outdoor recreation terminology in this report.

1. Recreation Market Area - the recreation market area is delineated. It is the zone of project influence, and is defined as the area

---

* See Appendix B.

from which approximately 80 percent of the people are drawn on one day outings, a weekend (overnight) trip, or both, to the area under consideration.

2. Recreational Demand - the expression of people's interest in outdoor recreation opportunities.

3. Participation Rate - the number of occasions within a given time during which individuals participate in the various outdoor recreational activities as set forth in the Outdoor Recreation Resources Review Commission (ORRRC) Study Report No. 19.

4. Activity Day - the participation by one person in one outdoor recreational activity during all or any part of one day. Thus, one person participating in several activities during a day could account for several activity days. 95/

5. Water-Oriented Activity - an all-inclusive term embracing water-dependent, water-enhanced and any other outdoor recreation activities in which water augments the recreational experience.

6. Water-Dependent Activity - a recreational activity which could not be carried out without the use of a body of water, water being an element essential to the conduct of the activity.

7. Water-Enhanced Activity - a recreational activity which is enhanced by the presence of a body of water, but which can be carried out in the absence of water.

8. Smirchment - modification of a body of water by additions of extraneous matter to water bottoms and shoreline which affect adversely in a demonstrable way, economic and aesthetic values. 135/

9. Improved Water Quality - water which has been recovered through pollution prevention and abatement measures to the point that its chemical and physical characteristics and aesthetic appearance are pleasing to the senses of sight, smell, taste and feel. In addition, such waters must also have been improved biologically to a condition that permits them to meet criteria required of water suitable for whole body contact water recreational activities.

10. Latent Demand - that recreation demand which is inherent in the population but not reflected in the use of existing facilities; additional participation which could be expected to occur if adequate facilities are made available.

11. Effective Population - that population which is considered to affect the recreation demand of a study area.

SUMMARY

Industrialization and urbanization have exerted a tremendous influence on recreation resources and activities of the Lake Erie Basin. Approximately 10 percent of the basin land area is urbanized and another 5 percent is used for roads, railroads and other utilities. Less than 2 percent is devoted to recreation.

The Great Lakes taken collectively is the largest body of fresh water in the world. Lake Erie, due to its proximity to large urban centers and its warm surface temperatures for extended periods in the summer, is a major focal point for outdoor recreation activities. Its water and tributary waters act as a magnet, drawing people in quest of a pleasant recreation experience. The ten million people of the basin and many from outside its boundary, seek basin waters in which to swim or fish, on which to boat, beside which to camp, picnic or walk; or just to look at.

There are two primary factors of a negative character for certain portions of the Lake Erie Basin which counter this magnetic attraction. They are: (1) the poor quality of the waters and (2) the unavailability of the waters for use by the public. The status of the water quality of the lake and its tributary waters has been studied and discussed in reports by several agencies and in popular news articles for more than thirty years. The Federal Water Pollution Control Administration and various state agencies are continuing such studies. It has been generally concluded that the quality of the inshore waters over much of the lake has been adversely affected though there are areas of exception such as the lakeward beaches of Presque Isle State Park in Pennsylvania and Cedar Point, East Harbor and Crane Creek beaches of Ohio. [76,99]

Though this knowledge operates to discourage people seeking a water-oriented recreation experience from using Lake Erie waters, attendance at recreation areas along the shore is high, often to the point of overuse. This apparently paradoxical situation is to a large extent explainable when the second primary factor, that of availability, is considered. Recreational waters, aside from Lake Erie, are extremely limited throughout most of the basin. This fact is particularly true in Zone 3, which basically includes portions of Ohio, Pennsylvania and New York, where only 13,683 acres of inland lakes, reservoirs and ponds serve a population of 4.2 million. Public access to them is similarly restricted. Industrial and urban facilities occupy many areas along the shoreline which are desirable for recreation.

For example, there are only 83 public recreation areas in the basin which offer swimming. It is estimated they satisfy approximately 16 million annual activity days of swimming while the total demand for swimming is calculated to exceed 48 million. Thus, the remaining demand for 32 million activity days of swimming must either be satisfied elsewhere or remain unsatisfied. The attempt by the people to take part in water-oriented recreation activity in the available public use areas places a tremendous strain on such areas regardless of water quality.

Inadequacy of access and facilities is not restricted to swimming. All types of water-oriented outdoor recreational activities suffer from the effects of these factors. In the analysis of recreational demand in the basin, it was found that the ORRRC Study contained the most applicable information on which to base the demand analysis. It was estimated as a result of this analysis that present demand for water-oriented outdoor recreational activities within the basin exceeds 245 million activity days annually. Of this, 108 million are for water dependent activities, 70 million of which occur during the summer months of June, July and August. This demand will grow, and by the year 2000, it may be expected to increase nearly three times the present figure. See Plate No. 2-1.

It was further estimated that there exists in the basin only about half of the developed public acreage needed to meet the present demand for outdoor recreation. These needs are lessened to some extent when the portion of the need provided by the private development of recreational facilities is considered. The available data concerning the extent to which private facilities fill the gap is inconclusive. It may be assumed, from evidence of over-use on public recreation areas, that the gap is large.

The pattern of distribution of the basin population makes most of the basin readily available to the major portion of the basin residents for day-use type recreational activities. The factors of increasing population and income, greater mobility and additional leisure time will mean ever increasing pressure on recreation facilities. To meet these needs, a coordinated, continuous planning and development effort by all agencies engaged in the provision of recreation facilities for the public is necessary.

Such planning efforts must develop means of meeting the following goals: (1) acquisition and development of adequate, suitable recreation facilities within reasonable distances of those who would use them, (2) reduction of present pollution and prevention of further pollution of recreational waters and (3) proper zoning and planned development of lands within and adjacent to recreation areas in order to enhance the recreational setting.

The Lake Erie Basin is highly urbanized with major industrial complexes found at several locations along the shores of the lake. Physical features conducive to water-oriented outdoor recreation are not as prominent in this basin as in areas to the northeast and northwest. This is especially true of inland lakes and streams. Since such features are in short supply and because of the tremendous pressures for suitable places in which to recreate exerted by the people of the basin, maximum effort should be directed toward the development of day-use facilities. Such emphasis is in agreement with findings of the ORRRC which recognize the urgent need of urban dwellers for areas that can be used for recreation activities. 92/

Plate No. 2-1 Most of the public bathing beaches in the Lake Erie Basin are presently receiving heavy use. As the demand continues to increase, action programs must be developed to meet the challenge. Photo courtesy Federal Water Pollution Control Administration, Fairview Park, Ohio.

PHYSICAL ASPECTS OF THE BASIN

Location and Extent

The area under consideration includes southeastern Michigan the extreme northeastern portion of Indiana, the northern tiers of counties in Ohio, a narrow belt in Pennsylvania and a portion of western New York.

Following the axis of the lake, the study area is approximately 400 miles long. It is 200 miles in width at its widest point which is in the western section. All the land area draining into the St. Clair River, Lake St. Clair, the Detroit River and the southern portion of the Niagara River is considered to be within the basin. As indicated on Table No. 3-1, the total land area including inland water area, comprises approximately 21,500 square miles. The study area includes only that portion of the Lake Erie Basin within the United States.

For the purposes of this study, the Lake Erie Basin has been divided into three zones. The division has been made principally to discuss separately certain aspects of recreation applicable to each zone. The zones are shown graphically on the frontispiece and are described as follows:

Zone 1 includes all or parts of twelve counties in the southeastern corner of Michigan plus a very small portion of Ohio. It contains the most highly urbanized portion of Michigan and, as such, its population generates a tremendous recreational demand. It is rather unique in that it has more recreational resources, lakes and woods and thus, a greater potential for meeting its local recreational demand than most highly urbanized areas.

Zone 2 covers all of the Maumee River Basin. The basin is roughly circular in shape, about one hundred miles in diameter. The basin is largely agricultural with several highly populated centers. This zone, largest in the basin, encompasses parts of three states; Ohio, Indiana and Michigan.

Zone 3 includes the remainder of Ohio, which drains into Lake Erie as well as part of Erie County, Pennsylvania and several western New York counties which make up the eastern end of the basin. It is a relatively narrow strip along the southern and eastern sides of the lake. The topography is gently rolling and most of the area, especially along the shore, is highly urbanized.

Table No. 3-1

THE LAKE ERIE BASIN

Total Basin Area (land and water) (US)	26,719 square miles
Lake Erie Water Area (US)	5,190 square miles
Inland Lake Area (US)	140 square miles
Basin Land Area (US)	21,389 square miles

LAND AREA COMPONENTS

State	Area in Basin (sq. mi.)	% of State in Basin	% of Basin in State
Michigan	5,764	10.1	26.8
Indiana	1,260	3.5	5.9
Ohio	11,712	28.6	54.4
Pennsylvania	480	1.1	2.2
New York	2,313	4.8	10.7
Total	21,529		100.0

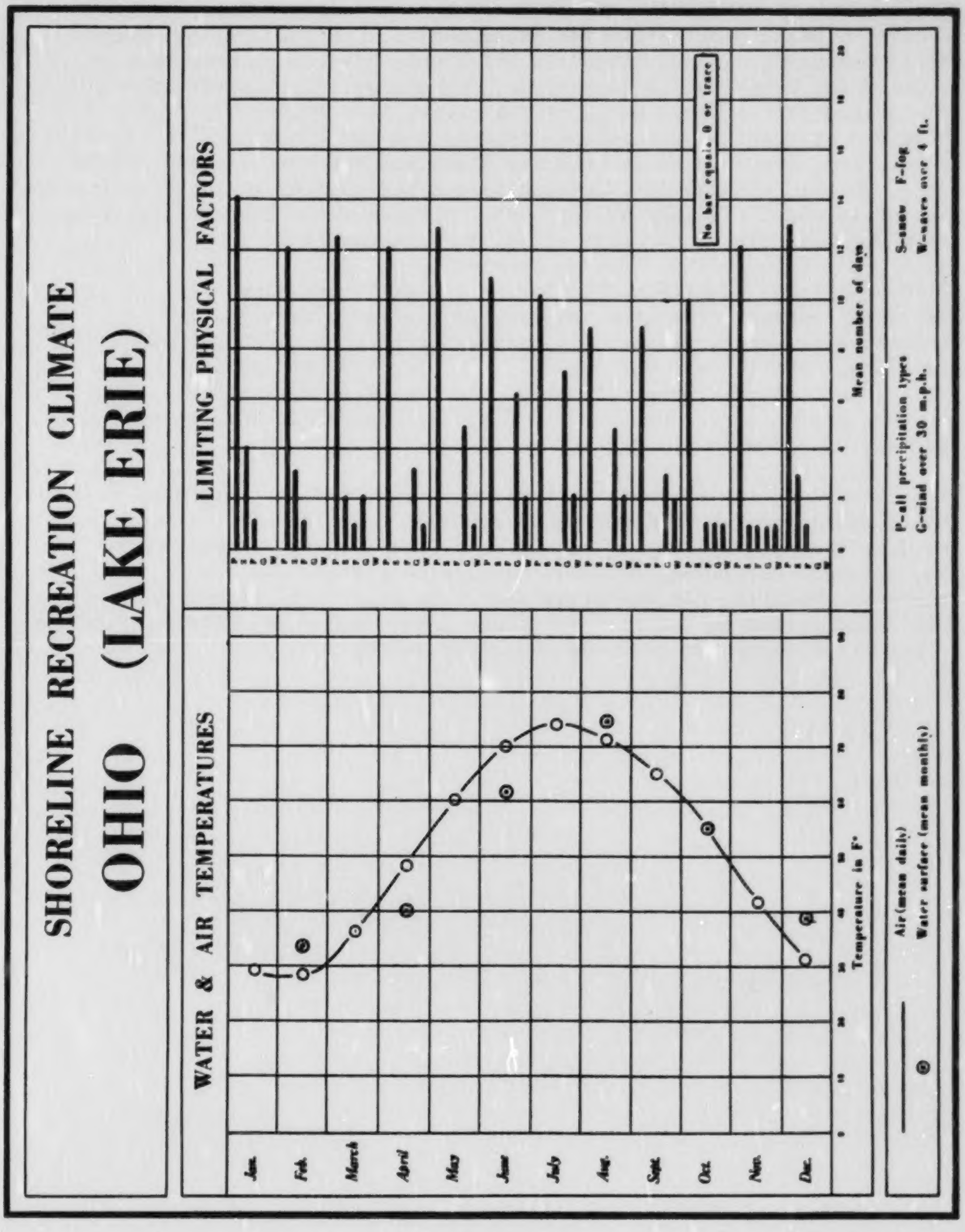
Source: Table 3-4 and 3-5.

Climate

The climate of the United States portion of the Lake Erie Basin is influenced directly by the lake itself only in the eastern section. The prevailing winds in the basin are from the south and west. Thus, the influence of the lake upon weather conditions is most evident in Canada. New York is the major recipient in the United States of weather modification directly related to Lake Erie. This is evidenced markedly in the winter when the area experiences an average of 109 inches of snowfall due to the moisture picked up by air masses moving across the lake. Also, the same winds in the summer contribute to excessively humid conditions. The other sections of the basin, except for a lake frontage fringe area, experience more of a continental climate with much lower snowfall and less humid conditions. The shoreline recreation climate over most of the lakeshore is shown graphically on Plate No. 3-1. Though climatic conditions make Lake Erie the most desirable for water sports, the state of the water quality, which will be discussed in Chapter 9, has influenced its desirability in certain areas.

The basin as a whole has a mean annual temperature of about 50 degrees Fahrenheit (° F.) with extremes of -30° F. and 100° F. 83/ The major portion of the basin has more than 150 frost free days with the first killing frost coming in the latter part of October. The basin averages less than 100 clear days a year with 120-160 cloudy days. The remainder are partly cloudy days. The average annual rainfall is about 34 inches with ranges from 32 to 38 inches. Thunderstorms occur on an average of 34

Plate No 3-1



SHORELINE RECREATION CLIMATE

OHIO (LAKE ERIE)

days a year in the vicinity of the lake.[144/] Fog is not at all uncommon near the lake. Buffalo averages 20 foggy days a year while Detroit averages 11. [144/] Many more days are foggy a portion of the day.

Though much of Lake Erie remains ice free many winters, ice formation occurs in bays, other protected areas and much of the shallow western basin annually. Ice formation is relatively greater on Erie than on other Great Lakes during most years. Recent aerial observations by the United States Army, Corps of Engineers, Lake Survey District, indicate at least 85 percent coverage during the winters of 1962 through 1966. Some areas, such as Lake St. Clair and the Port Clinton-island area, sustain substantial ice fishing and ice boating activity during the period in which they are frozen over. Surface water temperatures range from 30° F. in winter to about 75° F. in late summer.[83/]

Wind velocities as high as 91 miles per hour (mph) have been recorded; however, the wind velocity of the basin averages 10 mph. According to Weather Bureau information, during the five year period, 1961-1965, small craft warnings were in effect somewhere on Lake Erie all or part of 19.2 days per month on the average during the boating season, May-October. On Lake St. Clair such warnings were in effect an average of 7.7 days per month.

The climate in the vicinity of Lakes St. Clair and Erie presents several disadvantages to recreation; the three most apparent are the occurrence of fog, the large number of cloudy days with frequent thunderstorms and the frequent occurrence of windy days which prevent the use of small boats on the lake. On the other hand, the relatively warmer water for a prolonged period in summer makes these lakes much more suitable than the other Great Lakes for swimming and water skiing.

The Land

Geography and Topography

Like all of the Great Lakes Basins, the Lake Erie Basin is the result of Pleistocene glaciation, the present topography remaining virtually the same since then. However, recent erosion by the larger rivers is in evidence throughout. The basin land area may be divided into three general regions: (1) the Lake Plains, (2) the Till Plains and (3) the Glaciated Plateau. 140/ The Lake Plains make up a narrow strip five to ten miles wide on the eastern and southern sides of the Lake spreading out fan-shaped toward the western end and extending north around Lake St. Clair. The Till Plains constitute the southernmost portion of the western end, while the Glaciated Plateau region is found in the eastern end of the basin wherein lies the southern boundary of this portion of the basin. 140/ See Plate No. 3-2.

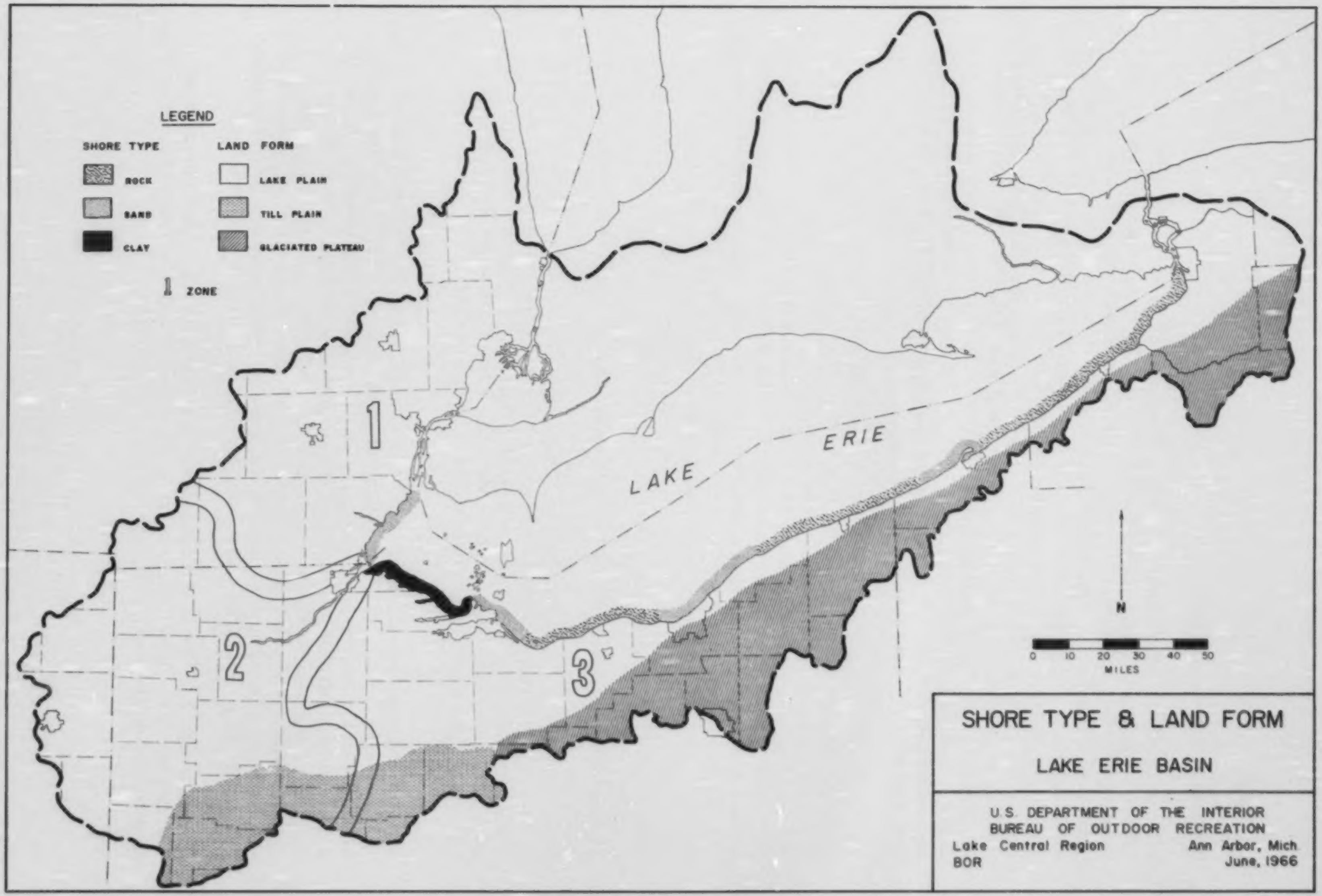
The section of the basin in New York has rolling, wooded hills. In Michigan at the western end of the basin, the morainal ridges formed by lobes of ice from the Saginaw Bay area have produced another area of rather low rolling hills that trend in a southwest-northeast direction. The land between these areas illustrate the flat-to-rolling topography associated with glaciation. Northwestern Ohio is extremely flat and at one time constituted an extensive swamp area. The rivers and their valleys present the only discontinuities.

Flora and Fauna

Presettlement conditions in northwestern Ohio consisted of extensive hardwood tracts covering areas of poorly drained land; this area was known as the Great Black Swamp. Settlement of this region was impeded until drainage was accomplished. This area supported a varied small game population. Deer, elk and bison roamed the region before settlement. Undoubtedly, the swamplands and marshes provided habitat for numerous species of waterfowl as they do presently.

Today, farming has extended over the entire basin where not precluded by metropolitan areas. The amount of wooded land area has been decreasing markedly until at present about one-tenth of the area remains forested. A concomitant depletion of wildlife occurred with land clearing and draining to the extent that deer are the only significant big game species remaining, and small game numbers have diminished appreciably. Waterfowl populations are served in several areas where lands have been set aside expressly for maintenance of natural marsh conditions.

Climatic and pedologic factors favor hardwood forest types throughout the basin with softwoods appearing in mixed stands in New York. The most common trees are oak, ash, maple, elm and hickory.


LEGEND
SHORE TYPE
ROCK
SAND
CLAY
LAND FORM
LAKE PLAIN
TILL PLAIN
GLACIATED PLATEAU
1 ZONE
1
2
3
LAKE ERIE
N
0 10 20 30 40 50
MILES

SHORE TYPE & LAND FORM

LAKE ERIE BASIN

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF OUTDOOR RECREATION
Lake Central Region Ann Arbor, Mich.
BOR June, 1966

Plate 3-2

Land Use

Urban Land

Land use in the Lake Erie Basin is under the influence of the metropolitan areas more than in any other of the Great Lakes Basins. Urban centers essentially ring the western end of the lake from Cleveland to Detroit. The Erie, Pennsylvania and Buffalo, New York SMSA's dominate the eastern end. At present, about 10 percent of the basin's land area is urbanized while another 5 percent is in such nonagricultural uses as roads, railroads and airports. [124/] Urbanization is increasing at a tremendous rate with encroachment upon agricultural and wild lands an accepted, if not wholly desired, occurrence. Urbanization decreases rapidly as one travels away from the lake. This undoubtedly is due to the locational advantage of the lakeshore for industry and transportation.

Almost all of the major cities in the basin have well-developed, efficient harbor facilities that are capable of accommodating both lake and ocean-going vessels. The major port activity is handling the commodities and raw material needs in the durable goods industries. Transshipment between railroads and lake freighters is the key to much of the economic activity within the basin.

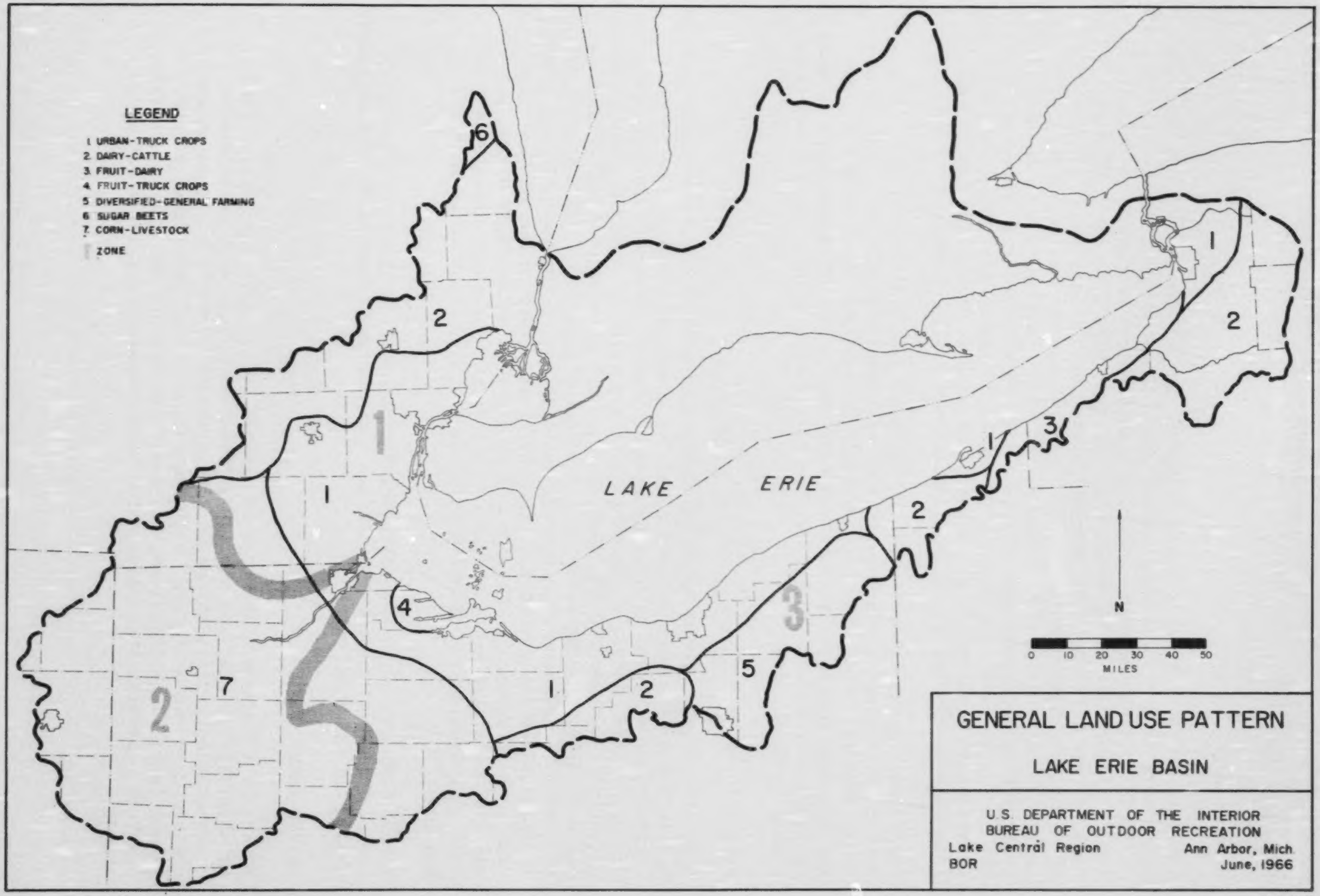
Agricultural Land

Diversified agriculture is the dominant land use, occurring in approximately 62 percent of the basin's land area. As might be expected, the basin's agricultural activity is highly oriented toward the nearby metropolitan markets. Truck and dairy farming and the growing of other specialty crops are prevalent. Some of the specialties, such as vineyards and orchards, are dependent upon the climatic influences of Lake Erie. The eastern portion of the lakeshore dramatically exhibits this since many miles of shoreline lands are cultivated for these pursuits. Meat production and cash crop farming appear most frequently in the portion of northwestern Ohio away from the lake as this area is part of the extensive midwestern Corn Belt. Agricultural land use within the basin is illustrated on Plate No. 3-3.

Trends indicate an overall decrease in the amount of farmland within the basin. However, localized areas may experience increments at the expense of pasture and woodland.

Forest Land

Forest land comprises thirteen percent of the basin's land area. Most of this land consists of small woodlots. There are four major concentrations of woodlands in the basin; the morainal areas in Michigan which contain numerous state and local recreation areas, the "Green belts" around Detroit and Cleveland, and the dissected plateau east of Buffalo, New York. Several state parks also have comparatively large timber stands.


LEGEND
1. URBAN-TRUCK CROPS
2. DAIRY-CATTLE
3. FRUIT-DAIRY
4. FRUIT-TRUCK CROPS
5. DIVERSIFIED-GENERAL FARMING
6. SUGAR BEETS
7. CORN-LIVESTOCK
ZONE
LAKE ERIE
N
0 10 20 30 40 50
MILES
1
2
3
4
5
6
7

GENERAL LAND USE PATTERN

LAKE ERIE BASIN

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF OUTDOOR RECREATION
Lake Central Region Ann Arbor, Mich.
BOR June, 1966

Plate 3-3

Recreational Land

Recreational land presently comprises slightly less than 2 percent of the total land area of the Basin. Publicly provided recreational land amounts to approximately 1.3 percent. Land devoted to recreation can be thought of as a complementary land use in rural areas where it can absorb substandard agricultural land, but it often becomes a highly controversial use in and near urban areas and along water frontage. This particular land use is dealt with in much greater detail in the chapter concerning the supply of outdoor recreation areas.

Table No. 3-2 depicts general land use within the basin.

Table No. 3-2.

LAND USE IN THE LAKE ERIE BASIN

(Acreages presented in thousands)

	Zone 1		Zone 2		Zone 3		Basin total	
Agricultural Land	Acreage	%	Acreage	%	Acreage	%	Acreage	%
Cropland	1,636	48.5	3,043	73.8	2,742	46.8	7,421	55.6
Pasture	158	4.7	164	4.0	475	8.1	797	6.0
Forest	353	10.5	366	8.9	1,080	18.4	1,799	13.5
Other	482	14.3	250	6.1	506	8.6	1,238	9.2
Inland Lake Area	50	1.5	26	.6	13.7	.2	89.7	.7
Urban and other Nonagricultural Land	690	20.5	272	6.6	1,046	17.9	2,008	15.0
TOTALS	3,369	100	4,121	100	5,862.7	100	13,352.7	100

Source: Agriculture Census 1959 148/
City-County Data Book, 1962 124/

The Water

Lake Erie

Lake Erie's total surface area is 9,910 square miles. Though not the smallest, (Lake Ontario is smaller) it is the shallowest and the most southerly. From east to west the lake is 241 miles in length, and it is 57 miles, north to south, at its widest point. Its deepest sounding is 210 feet while its mean depth is 58 feet. Lake Erie is the only Great Lake whose bottom does not extend below sea level. 149/

The lake may be divided into three general sections; an eastern basin, central basin and western basin. The eastern basin is the deepest of the three, containing the maximum lake depth and having a major portion at depths greater than 100 feet. The western boundary of this subbasin approximates a line connecting Erie, Pennsylvania and Long Point, Ontario. The central basin is the largest in areal extent, with its western boundary identified by a line connecting Sandusky, Ohio and Pelee Point, Ontario. This subbasin has a rather level bottom with a maximum depth of 84 feet. The westernmost subbasin is the shallowest having a maximum depth of 54 feet and a mean depth of just under 25 feet. Along the south and west shore, the slope of the bottom is very slight, with the 21 foot contour being 5 to 7 miles from the shore. There is a small group of islands in this basin, north and east of Sandusky. The largest of these, Pelee Island, lies in Canadian waters. Kelleys Island and North, South and Middle Bass Islands are the principal islands of the group in United States waters. 149/

Due to the shallow character and relatively southerly location, Lake Erie is warmer than the other Great Lakes. Its water surface temperature reaches 75° in late summer. These qualities combine to produce a varied, abundant aquatic life and to make this lake the most desirable of the Great Lakes for many water sports.

Lunar tides occur on the Great Lakes; however, they are only 1½ to 3 inches in magnitude which are insignificant from the recreational standpoint. Seasonal fluctuation averaging 1.5 feet on Lake Erie are in evidence as well. Such fluctuations have some effect on recreational boating though ordinarily low water is experienced in winter with the high level occurring in July. Long term fluctuations resulting in high or low cycles caused by variations in precipitation over extended periods of time in the Great Lakes have the most pronounced effect on recreational use of the lake.

Another factor to be considered in discussing fluctuation of the lake levels are the short period fluctuations due to wind, barometric disturbances and seiches.

> Because of the lake's shallowness and also due to the prevailing wind lying in the direction of the lake's long axis, the short period fluctuations can be appreciable. Records show that on

occasion, differences in water level of as much as 13 feet have existed between Toledo, Ohio, and Buffalo, New York. Once the wind stops blowing or the atmospheric pressure changes, the water oscillates back and forth in the lake, thereby causing an alternating rise and fall of levels at the lake ends. 63/

Lake St. Clair

Lake St. Clair, a small lake in comparison to the Great Lakes, is the connecting body of water between Lakes Huron and Erie. It is essentially round, being 26 miles long, with a breadth of 24 miles. The lake has a water surface area of 430 square miles and is very shallow having a maximum natural depth of only 21 feet and a mean depth of 10 feet. A navigation channel of 27.5 feet is maintained throughout its length by the United States Army, Corps of Engineers. Recreationally, Lake St. Clair is far more important to residents of Michigan than the Michigan portion of Lake Erie. The numerous inslands in the lake are intensively used by boaters for recreational purposes.

The Lakeshore

The United States shoreline of Lake Erie and its islands is about 490 miles in length, with Lake St. Clair and its islands adding about 98 miles. The shoreline is extremely regular, with the Marblehead-Sandusky Bay area of Ohio and Presque Isle Peninsula of Pennsylvania offering the the only discontinuities of any consequence. The Michigan frontage, both of Lake St. Clair and Lake Erie, is characterized predominantly by marsh. This shoreline character extends eastward along the south shore of Lake Erie to Huron, Ohio. The limestone bluffs of the Marblehead peninsula in Ohio are distinctive as is the Cedar Point peninsula which is the most extensive beach formation in Ohio. The remainder of the Ohio shore is characterized by eroding bluffs, varying in height from a few to fifty feet. Eroded bluff materials form narrow strip beaches of sand and gravel fronting the bluff areas. See Plate No. 3-4. The Pennsylvania shore consists of rather high bluffs varying between 30 and 60 feet which are also fronted by narrow strip beaches. Presque Isle peninsula, a recurved sand spit, presents the only extensive beach area on this portion of the coast. The New York shoreline is also one of bluffs, with sand beaches occurring infrequently. Generalized shore types are illustrated on Plate No. 3-2.

Erosion is continuous along a major part of the Lake Erie shore. Structures have been erected for the protection of beaches and the water frontage but are largely ineffective.

A summary of the extent of Lake Erie-Lake St. Clair shoreline by state is given on Table No. 3-3.

Plate No. 3-4 Above - The shoreline along Perry Township Park in Lake County, Ohio. Though the eroding bluff area is not well suited as a swimming beach, it shows evidence that such use is made of it. BOR photo. Below - Huntington Beach near Cleveland, Ohio, showing an area of bluff beach which has been stabilized and developed for recreational use. Photo courtesy Cleveland Metropolitan Park District, Cleveland, Ohio.

Table No. 3-3

LAKE ERIE - ST. CLAIR SHORE
(In Statute Miles)

	Michigan	Ohio	Pennsylvania	New York	Total
Lake St. Clair	98*	--	--	--	98*
Lake Erie	50	312**	51	77	490
Total Lakeshore	148	312	51	77	588
St. Clair River	50	--	--	--	50
Detroit River	64	--	--	--	64
Total River Shore	114	--	--	--	114
Total Basin Shore					702*

---

* Includes islands

** Includes Sandusky Bay and Islands

Source: U.S. Lake Survey District, Corps of Engineers, Detroit, Michigan, data, 1960.

Inland Lakes

The Lake Erie Basin has few natural inland lakes. Only in the Michigan portion of the basin is there a significant acreage of such waters. Artificial impoundments appear rather frequently throughout the basin.

In Zones 2 and 3, such impoundments were established principally as a source of domestic water supply. They are seldom made available for recreational uses other than fishing. In addition, many of the lakes of the basin possess marl or clay bottoms and shores which render them less suited for recreational activities. An inventory of natural and artificial lakes by county appears in Table No. 3-4.

Rivers

Continental ice sheets covered the entire area of the present day Lake Erie Basin, and the drainage patterns of the lake's tributary streams exhibit control for the most part by glaciated features. Predominant control of drainage in the western half of the basin is by glacial moraines. After leaving the peripheral morainal areas, the streams traverse rather irregular till plains, are deflected by intermediate moraines, and enter upon the rather level lake bed of the former glacial Lake Maumee. This is best exemplified by the Blanchard-Auglaize-Maumee system. The irregular

Table No. 3-4

INVENTORY OF INLAND LAKES IN THE LAKE ERIE BASIN

Zone State County	No. Lakes Natural & Artificial	Approximate Acreage	Public Access Points
ZONE 1			
MICHIGAN [1/]			
Sanilac (part)	3	24	0
Lapeer (part)	26	704	0
St. Clair (part)	29	556	0
Macomb	34	1,458	1
Wayne	51	2,539	8
Oakland (part)	322	20,810	48
Livingston (part)	138	7,208	27
Washtenaw (part)	158	9,302	26
Monroe	52	1,211	0
Lenawee (part)	69	2,986	12
Jackson (part)	36	3,333	6
Michigan total	918	50,131	128
OHIO			
Fulton (part)	1	11	1
Lucas (part)	5	61	0
Ohio total	6	72	1
Zone 1 total	924	50,203	129
ZONE 2			
MICHIGAN			
Lenawee (part)	18	2,272	4
Hillsdale (part)	49	1,318	18
Michigan total	67	3,590	22
INDIANA [2/]			
Steuben (part)	8	1,779	6
De Kalb (part)	3	67	2
Allen (part)	3	59	1
Adams (part)	1	33	1
Indiana total	15	1,938	10

Table No. 3-4 (con.)

Zone State County	No. Lakes Natural & Artificial	Approximate Acreage	Public Access Points
ZONE 2			
OHIO [3]			
Allen	28	977	8
Auglaize (part)	7	2,610 [4]	4
Defiance	8	1,065 [5]	5
Fulton (part)	10	294	6
Hancock	13	373	5
Hardin	2	54	0
Henry	4	2,015 [6]	3
Lucas (part)	15	272 [6]	4
Mercer (part)	3	11,111 [4]	1
Paulding	4	936 [5]	1
Putnam	8	123	2
Shelby (part)	1	5	0
Van Wert	2	69	1
Williams	13	270	0
Wood	4	60 [6]	1
Wyandot	1	5	1
Ohio total	123	20,239	42
Zone 2 total	205	25,767	74
ZONE 3 [7]			
OHIO			
Ashland (part)	8	123	0
Ashtabula (part)	9	166	1
Crawford (part)	5	127	3
Cuyahoga	14	169	7
Erie	2	305	1
Geauga	34	2,532	5
Hancock	7	309	6
Huron	14	611	8
Lake	7	123	0
Lorain	22	325	8
Marion (part)	0	0	0
Median (part)	20	319	3
Ottawa	7	215	0
Portage (part)	47	4,921	8
Richland (part)	0	0	0

Table No. 3-4 (con.)

Zone State County	No. Lakes Natural & Artificial	Approximate Acreage	Public Access Points
ZONE 3			
OHIO (con.)			
Sandusky	7	134	2
Seneca	9	88	2
Summit (part)	38	880	7
Trumbull	6	53	0
Wood	4	22	0
Wyandot	5	647	2
Ohio total	265	12,069	63
PENNSYLVANIA			
Crawford	0	0	0
Erie	3	50	0
Pennsylvania total	3	50	0
NEW YORK [8/]			
Cattaraugus	20	440	3
Chautauqua	6	50	0
Erie	23	379	10
Genesee	10	230	6
Wyoming	17	465	10
New York total	76	1,564	29
Zone 3 total	344	13,683	92
BASIN TOTALS	1,473	89,653	295

1/ Source: Michigan portion Lake Inventory Bulletins by C. R. Humphrys and R. F. Green, Michigan State University (lakes 5 acres and larger).

2/ Source: Guide to Indiana Lakes, Indiana Department of Conservation.

3/ Includes all lakes 5 acres and more in surface area. Source: Water Inventory of the Maumee River Basin, Ohio Department of Natural Resources Report No. 11 and Woldorf, A. F., "Gazetteer of Lakes and Ponds on Ohio." Ohio Department of Natural Resources, Division of Water.

4/ For inventory purposes, the 13,440 acres of Grand Lake St. Marys (one-fifth of Auglaize County and four-fifths in Mercer County) are listed with the Maumee River Basin, although lying partly in the Wabash River Basin.

5/ Defiance Power Dam, 1,240 acres, lies one-fourth in Defiance County and three-fourths in Paulding County.

6/ Providence Dam: Total area of 2,110 acres; Henry County, 2,000 acres, Lucas County, 80 acres, and Wood County, 30 acres.

7/ Information for Zone 3 is based on county maps and New York Water Resources Commission reports and Water Inventory of Cuyahoga and Chagrin River Basin Report No. 2, Department of Natural Resources.

8/ Source: Unpublished data obtained from New York Conservation Department, Division of Water Resources.

topography of the moraines and the flatness of the former lake bed combine to produce a poorly drained area.

In the eastern portion of the Basin, most of the river headwaters are in the glaciated plateau region. From Cleveland, Ohio, eastward into Pennsylvania, between the plateau and the lake, the Portage Escarpment acts as a deflector to the lakebound rivers. Examples are the Grand River and Conneaut Creek. From Erie, Pennsylvania, to Dunkirk, New York, a distance of approximately 45 miles, the plateau escarpment is generally within 5 to 10 miles of Lake Erie and the streams in this section normally have a rather straight, short course to the lake. The basin then expands to the east as the plateau escarpment trends eastward away from the lake. The stream pattern in this region is influenced by the Niagara Escarpment, which forms the watershed boundary, and a smaller scarp to the south, both of which trend east-west. The drainage system of the Lake Erie Basin is illustrated on Plate No. 3-5 and a list of major watersheds can be found in Table No. 3-5.

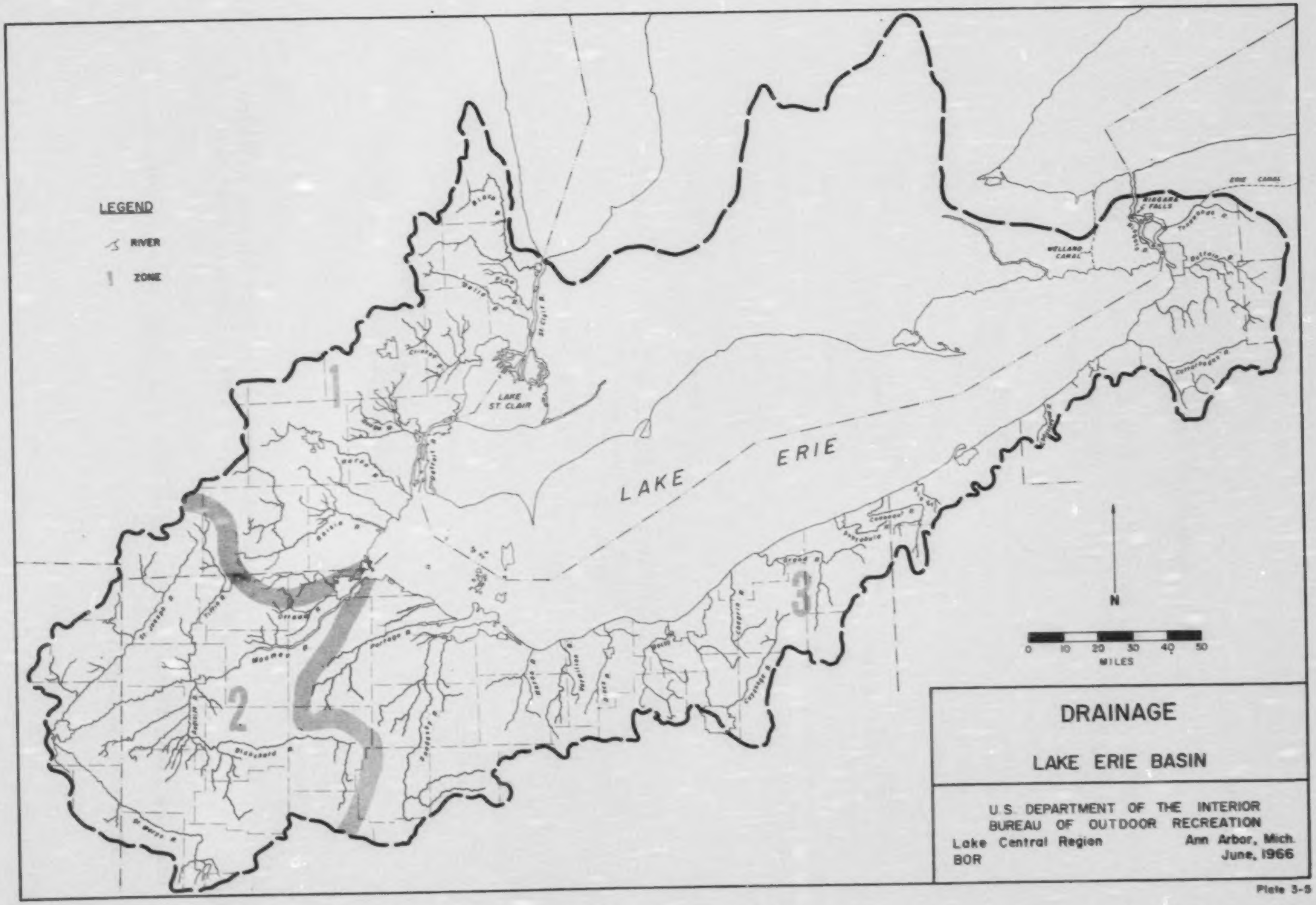
The rivers of the basin serve primarily the purposes of municipal, agricultural and industrial water supply, effluent disposal and recreation including fish and wildlife conservation. Commercial navigation is limited to the mouths of those larger rivers terminating in metropolitan areas.

All the rivers in the basin can be considered as having scenic quality. Many rivers in their upper reaches possess attractiveness which they lose as they progress downstream. This loss can be attributed to several reasons; the less varied topography as the rivers leave the moraine or plateau areas, the increasing amount and concentration of population and smirchment* of the waters.

Four special cases relating to rivers exist in the Lake Erie Basin; these are the St. Clair River, Detroit River, Niagara River and the Erie Canal. As such, they are most probably considered as connecting waterways rather than rivers. These waterways support a heavy commercial traffic in addition to providing most of the uses mentioned before.

---

* Defined on page 1-3 of this report.


LEGEND
RIVER
ZONE
1
2
3
LAKE ERIE
LAKE ST CLAIR
St Clair R
Black R
Belle R
Clinton R
Rouge R
Detroit R
Huron R
Raisin R
Ottawa R
Tiffin R
St Joseph R
Maumee R
Auglaize R
Blanchard R
St Marys R
Portage R
Sandusky R
Huron R
Vermilion R
Black R
Cuyahoga R
Chagrin R
Grand R
Ashtabula R
Conneaut R
Cattaraugus R
Buffalo R
Tonawanda R
Niagara R
NIAGARA FALLS
WELLAND CANAL
ERIE CANAL
N
0
10
20
30
40
50
MILES

DRAINAGE

LAKE ERIE BASIN

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF OUTDOOR RECREATION
Lake Central Region
Ann Arbor, Mich.
BOR
June, 1966

Plate 3-5

Table No. 3-5

MAJOR WATERSHEDS OF THE LAKE ERIE BASIN

Zone 1	(sq.mi.)
Michigan	5,294
Black	673
Pine-Belle	460
Clinton	741
Rouge	434
Huron	892
Raisin	1,034
Misc.	1,060
Ohio	188
Tenmile-Ottawa	133
Misc.	55
Zone total	5,482

Zone 2	(sq.mi.)
Michigan	470
St. Joseph	219
Bean	251
Indiana	1,260
St. Joseph	603
St. Marys	359
Misc.	298
Ohio	4,856
Tiffen	553
St. Joseph	238
St. Marys	458
Auglaize	2,448
(Ottawa)*	(373)
(Blanchard)*	(762)
Misc.	1,159
Zone total	6,586

Zone 3	(sq.mi.)
Ohio	6,668
Portage	587
Sandusky	1,421
Huron	403
Vermilion	272
Black	467
Rocky	294
Cuyahoga	813
Chagrin	267
Grand	712
Misc.	1,432
Pennsylvania	480
Conneaut	154
Misc.	326

Zone 3 (con.)	(sq.mi.)
New York	2,313
Cattaraugus	570
Buffalo-Cayuga-Cazenovia	424
Tonawanda	649
Misc.	670
Zone total	9,461
Grand Total for the Lake Erie Basin	21,529

Source: Department of Natural Resources, map of Ohio showing principal streams and their drainage area, 1964. Michigan Water Resources data.

Drainage Basin Series Reports - New York State Department of Health

* Tributary to Auglaize.

THE PEOPLE

Resident Population

This basin, with its large metropolitan complexes, is the most populous of the five Great Lakes Basins. The population in 1960 was 9.8 million. Since 1940, a 42 percent increase of population has occurred. The present population of the basin is shown on a county basis on Plate No. 4-1. This plate illustrates the large concentration of population in three counties which are located at each end of the lake and near the center of the south side. It further illustrates the relative lack of population in Zone 2 of the basin.

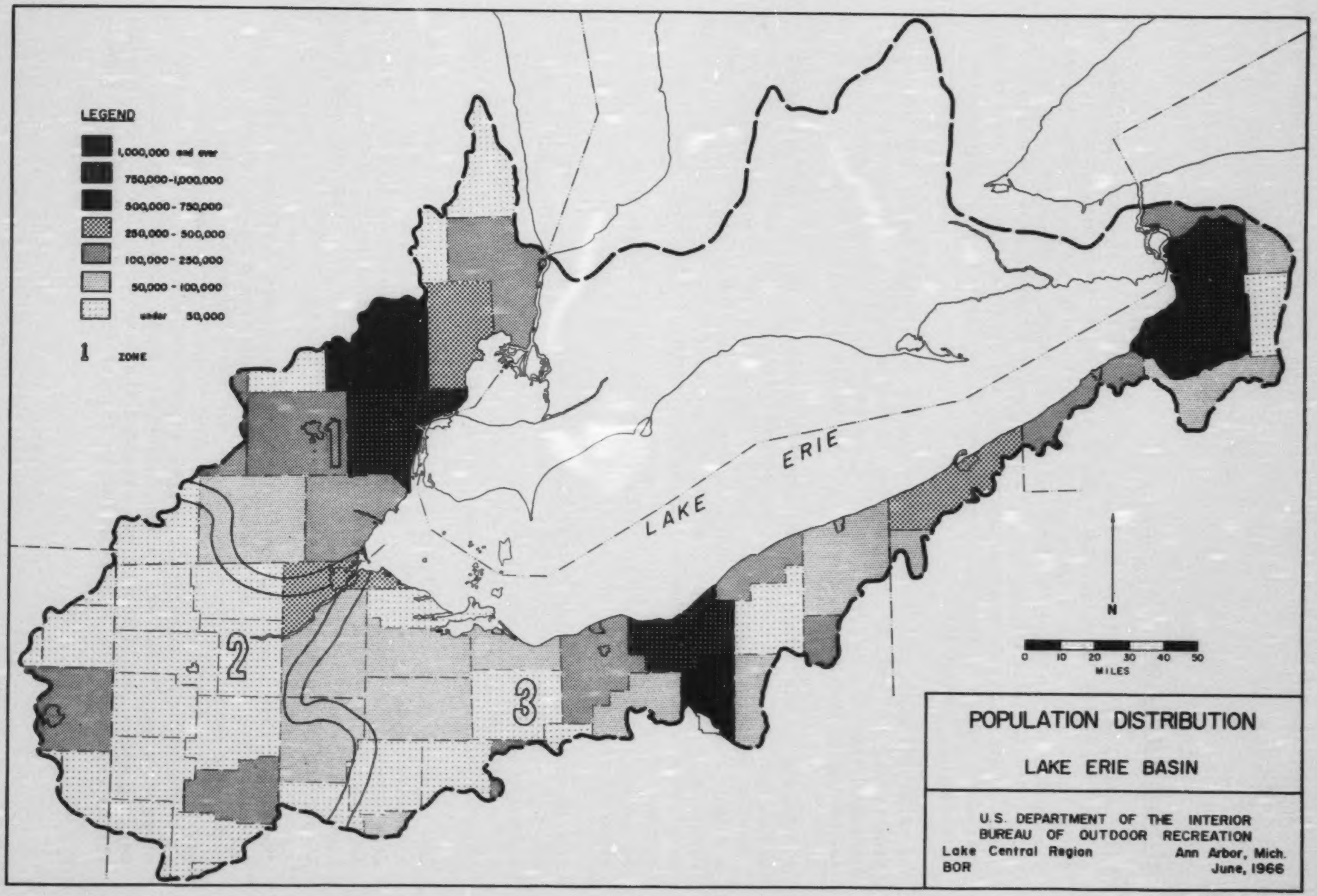
It is significant that none of the counties within the basin lost population during the period 1950 to 1960, although a decline occurred in two counties between 1940 and 1950. Approximately 80 percent of the counties gained population at an increasing rate in the 1950-1960 decade.

The Bureau of the Census has designated ten SMSA's whose urbanized areas lie within the basin. During the period 1960-1963, six additional basin counties were given status as SMSA's. These were the counties of Lapeer and Monroe in Michigan and Wood, Median, Portage and Geauga in Ohio. The urbanized areas within the SMSA's comprise approximately 10 percent of the total land area of the basin. Thus, 80 percent of the basin population resides on 10 percent of the land area. Refer to Plate No. 4-2 which illustrates the relationship of land area to population in each of the zones of the basin.

The major portion of the basin will experience increasing urbanization in the years to come. Coalescence of the urbanized territories of Detroit, Toldeo and Cleveland can be envisioned in the near future. The addition of Monroe County, Michigan, to the Toledo SMSA and the rapid growth of Lorain County, west of Cleveland, appears to substantiate this prediction.

The rates of population change within the basin (past, present and future) are illustrated in Plate No. 4-3. In 1960, the population of Zone 1 and Zone 3 were nearly equal, but in projecting the population in 2020, Zone 1 is expected to double in size while Zone 3 will increase three-fold. While Zone 2 will double its population by 2020, it will still contain only about 10 percent of the total basin population as it did in 1960.

The large urban concentrations outside the basin are depicted on Plate No. 4-4. Their effect on the basin will be developed in the chapter on Demand for Outdoor Recreation. There are two components to population growth: a natural increase (births over deaths) and a net migration (immigration over emigation). Often a positive migration effect is the cause of a particular area's rapid growth. In portions of the basin, net migration into a county has exceeded the natural increase. For example, the natural increase of Lorain County for the decade 1950-1960 was slightly


LEGEND
1,000,000 and over
750,000-1,000,000
500,000-750,000
250,000-500,000
100,000-250,000
50,000-100,000
under 50,000
1 ZONE
LAKE ERIE
1
2
3
N
0 10 20 30 40 50
MILES

POPULATION DISTRIBUTION

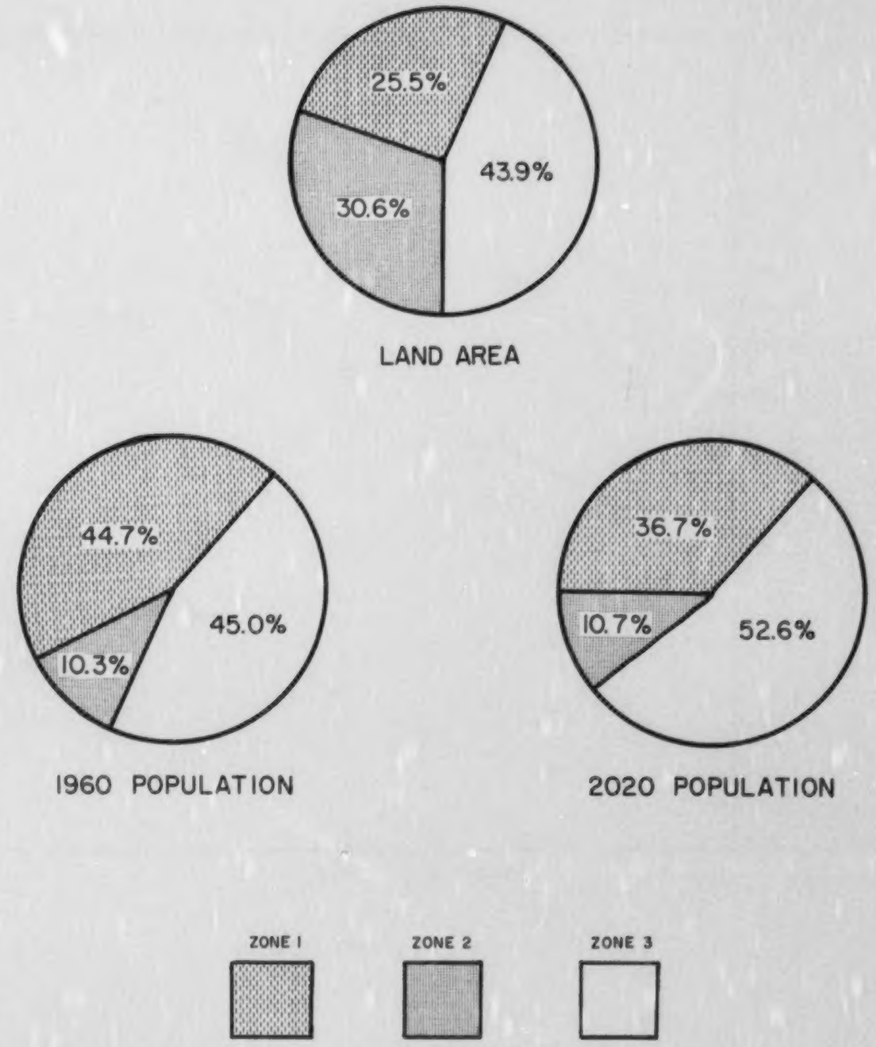
LAKE ERIE BASIN

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF OUTDOOR RECREATION
Lake Central Region Ann Arbor, Mich.
BOR June, 1966

PLATE NO. 4-1

COMPARISON OF LAND AREA AND POPULATION BY ZONE

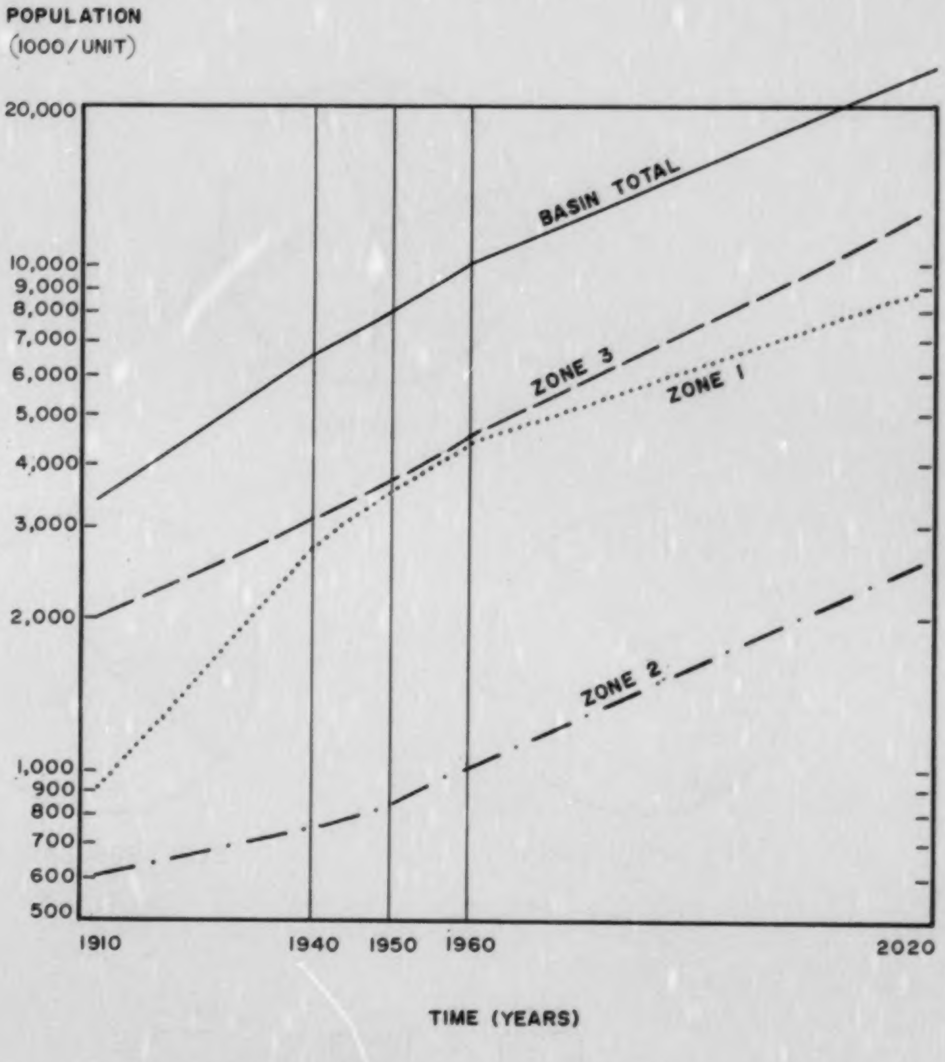
LAKE ERIE BASIN



FJ
Plate 4-2

RATES OF POPULATION CHANGE BY ZONE

LAKE ERIE BASIN



FJ

URBAN POPULATION DISTRIBUTION

NORTHEASTERN UNITED STATES : 1960

(AREAS OVER 50,000)

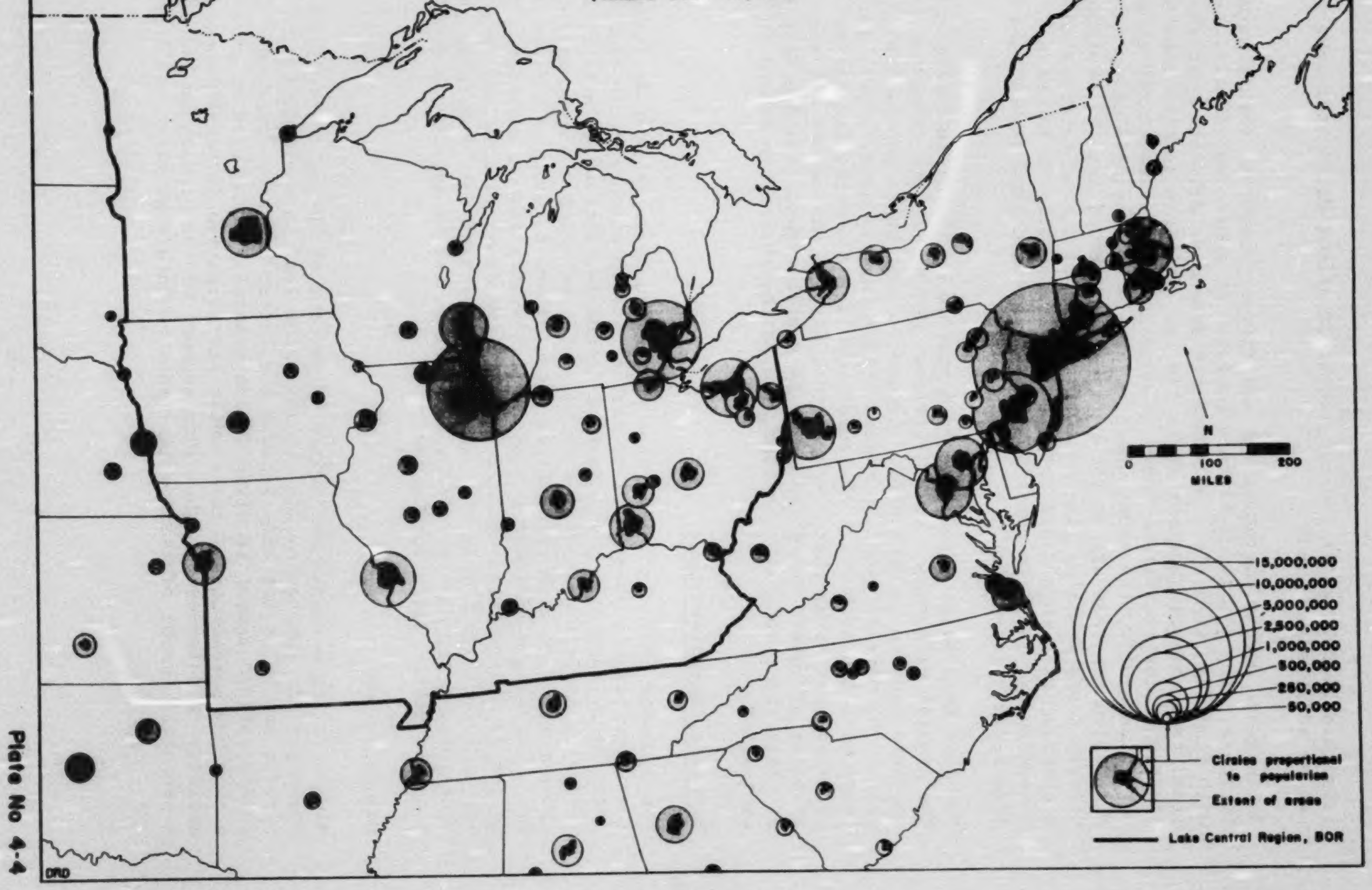

N
0
100
200
MILES
15,000,000
10,000,000
5,000,000
2,500,000
1,000,000
500,000
250,000
50,000
Circles proportional to population
Extent of areas
Lake Central Region, BOR
DRD

Plate No 4-4

less than 34,000, while the net migration effect during the same period was an additional 35,600.

An increase due to migration has a different character than a natural increase. The migration element consists of adult individuals, single and with families, that place an immediate demand on recreation areas. This is unlike a natural increase where the age structure remains constant and the demand for recreation based on population increase climbs at a constant rate. Generally, the areas where migration is playing a major role in population increase are in the peripheral zones of Detroit, Toledo, Cleveland and Buffalo. In these areas demands can be anticipated as increasing at a more rapid rate than would normally be the case. Consequently, facility needs will be greater and land values will be more rapidly increasing.

The Lake Erie Basin population is dominated by the urban concentrations. The general differences in recreational demand between the urban and rural segments need to be mentioned. Generally, the urban population is considered to be more affluent, has more leisure and is usually well served by transportation networks. The rural population has the locational advantage of being near areas where recreational desires can be met, by their own, or other privately owned lands, or by public areas. The specific effects of these conditions will be discussed in the chapter on demand for outdoor recreation.

Economic Characteristics

The economic characteristics of a population serve to give an insight into that population's propensity to participate in outdoor recreation. The ORRRC Study indicates participation in outdoor recreation activities increases as income increases to the point at which a person making greater amounts tends to seek specialized pursuits and to provide his own facilites. Also, the amount of leisure time available will affect a person's participation in a direct relationship. These two items, income and leisure time, are affected directly by the economic pursuits of the respective population. Therefore, it appears pertinent to briefly discuss selected economic pursuits of the basin population.

Manufacturing

Manufacturing accounts for nearly 40 percent of the total civilian employment in the basin. 152/ It shares the lead in employment with Service and Sales but only because the latter has been combined. The manufacturing segment received income generally considered to be well within the categories of those whose participation in recreational activity is relatively high. This segment of the population has a substantial amount of leisure time and the future promises still more.

Service and Sales

It is primarily due to their numbers that this occupational sector derives its significance in its effect upon recreational demand. This group likewise makes up nearly 40 percent of the basin's employment. Income categories are generally lower and leisure time is likewise lower.

A subgroup that deserves special attention is the Professional and Technical occupations. While their numbers are not large, they are very important in their effect on recreational demand. This subgroup is in the income category of those having the highest participation rates.

Agriculture

Of all occupational groups, this sector possesses the lowest participation rates. This apparently is due to the nature of the work involved, which, with its long hours of outdoor work, leaves little time and interest for additional outdoor activity. While income may be relatively high in some areas, the factors mentioned above are sufficient to counterbalance most of its effect. The above factors, coupled with the group's relatively small numbers, only 2.5 percent of the basin's employment, makes it apparent that agricultural workers make a small contribution to the total demand for outdoor recreational activity. 152/

Future Nationwide Occupational Trends

Of the previously mentioned occupational groups, the services sector will experience the most rapid growth in employment throughout the Nation. ORRRC has predicted a 21 percent increase by 1976 over 1957 figures. It is expected to increase at a more rapid rate than that anticipated for the total civilian employment. This growth will be supported primarily by the demand for services of high value, such as medical, legal, educational and business services. 97/

The slight decline in the relative importance of manufacturing is expected to continue with a 12 percent relative decrease in employment for the period 1957-1976.

Since 1900, agriculture has experienced a decline in absolute terms as well as relative, that is, from one-third the total civilian employment to less than one-tenth. While continuing its decline in relative terms, a reversal is expected after 1976 when employment is expected to increase due to a projected expansion of foreign markets.

Future Basin Occupational Trends

In an attempt to analyze the basin as a unit, it is felt National trends can be applied only generally. Expected increase in services, especially those of high value are expected to occur at a faster rate in this highly urbanized area. The fact that the high value services will assume a greater proportion indicates that the average income of employees in this sector will rise, thereby increasing the significance of this group in recreational demand.

The number of agricultural employees is expected to decline, but at a rate less than that for the Nation. This is based upon the need of the great urban population for truck and dairy produce. The favorable climatic influence of Lake Erie provides an exceptionally fine orchard and vineyard region.

Although manufacturing will decline in relative terms, it will continue to dominate the economy of the basin. This domination is attributable to the existence of the Great Lakes port facilities and the St. Lawrence Seaway.

Income

Per capita income, used as a reflection of the foregoing statements, gives an indication of the propensity to participate in recreational activity. However, it must be kept in mind that the relationship of income and recreational activity does not operate in a straight line manner. Per capita income nationally in 1960 was $2,217.[151] It was $2,317, $2,188, $2,331, $2,256 and $2,778 for Michigan, Indiana, Ohio, Pennsylvania and New York, respectively, during the same year. The ORRRC Study predicts a National per capita income of $2,941 for 1976 and $4,104 for the year 2000. If a like trend occurs in the basin states, these states will enjoy an affluence above that of the Nation as a whole. With the high rate of urbanization and population growth in the basin portion of these states, it is believed that the basin will experience greater increases than within the respective states as a whole.

Leisure Time

In 1959-1960, a National survey was made to determine the use of leisure time. Of all leisure time activities stated by each respondent, outdoor recreation activities were mentioned one-sixth of the time.[96] Time was listed, by those questioned, more than three times as often as income, as being a restriction on participation. Time devoted to work was the principal restriction, rather than that which was devoted to family-connected activities.[96] Leisure time available in the future will largely be determined by labor-management decisions which at best are difficult to anticipate. Historical trends, however, indicate a reduction of the present work week which has been about 41 hours in recent high employment years to 36 hours by 1976 and about 32 hours by 2000.[97] It has been estimated that the manufacturing and service and sales groups will conform to this projection quite closely, while agriculture will continue to lag, but by decreasing amounts.

Mobility

At present, automobile travel heavily dominates the travel scene in this country, including that for outdoor recreational pursuits. Our National auto travel system consists of nearly 60 million passengar cars, 3.6 million miles of roadways, service facilities, accommodations for travelers, special governmental agencies, and the supporting production and distribution facilities. 97/ The National System of Interstate and Defense Highways was approximately half-completed at the end of 1965 with 20,500 miles open to traffic. Of this total, 990 miles of Interstate highways are presently open to traffic in the Lake Erie Basin. Reference is made to Plate No. 4-5.

From the table shown below, the Lake Erie Basin has 5.5 percent of the Nation's people, 6.3 percent of the Nation's automobiles, and 4.8 percent of the completed interstate highway mileage. Also, the Lake Erie Basin has a higher automobile per capita figure than the Nation.

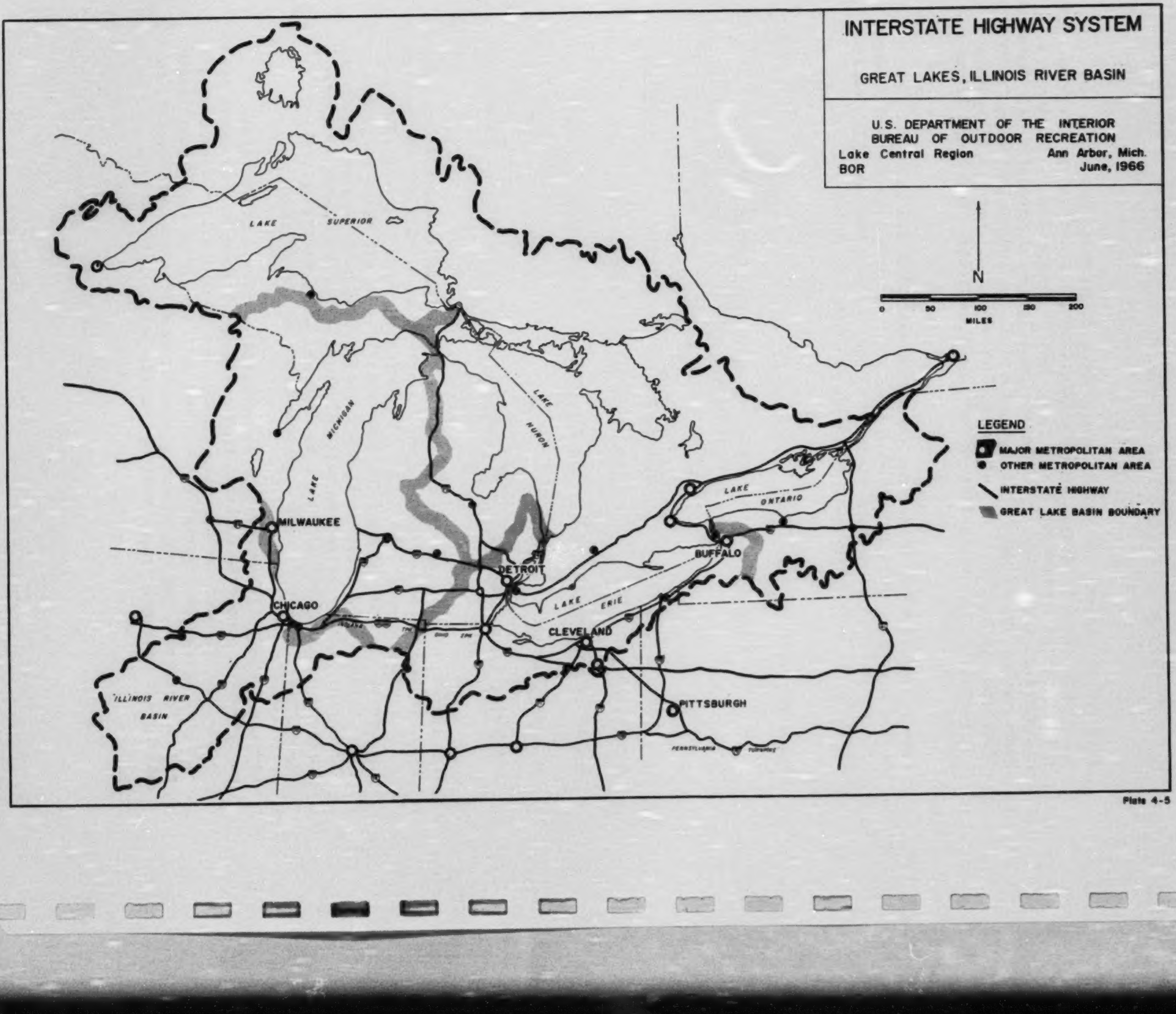
Table No. 4-1

COMPARISON OF NATION-BASIN AUTOMOBILES PER CAPITA AND INTERSTATE MILES

	United States	Lake Erie Basin	Percent of Nation
Population	179,323,175	9,854,608	5.5
Number of Automobiles 124/	58,268,031	3,646,205	6.3
Auto Per Capita	0.32	0.37	-
Completed Interstate Miles 146/	20,500	990	4.8

Air travel is rapidly becoming an important mode of transportation. In 1964, the number of air passengers was more than 81 million, an increase of 14.5 percent over 1963. 146/ If predictions come true, by 1976, air transportation will account for more than half of all trips over 500 miles. The metropolitan areas of the basin have well developed airport facilities and are served by major airlines. The increasing ease and economy of air travel will tend to draw the basin residents seeking vacation outdoor recreation experiences out of the basin.

While recreational activity can be expected to rise with increased mobility, it should be realized that mobility is largely a function of income, and in some cases, leisure time, and should not be viewed as a strictly independent variable. Rather, as a result of increasing income and leisure time, we can expect a rise in mobility as a concomitant, of which, recreational travel will be a large part. 97/



INTERSTATE HIGHWAY SYSTEM

GREAT LAKES, ILLINOIS RIVER BASIN

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF OUTDOOR RECREATION
Lake Central Region Ann Arbor, Mich.
BOR June, 1966

N
0
50
100
150
200
MILES
LEGEND
MAJOR METROPOLITAN AREA
OTHER METROPOLITAN AREA
INTERSTATE HIGHWAY
GREAT LAKE BASIN BOUNDARY
LAKE SUPERIOR
LAKE MICHIGAN
LAKE HURON
LAKE ERIE
LAKE ONTARIO
MILWAUKEE
CHICAGO
DETROIT
CLEVELAND
BUFFALO
PITTSBURGH
ILLINOIS RIVER BASIN
PENNSYLVANIA TURNPIKE

Plate 4-5

Visiting Population

The character of the basin's visiting population is rather unique in that it is to a large extent for day-use purposes. This is not to say people do not come into the basin for extended periods. With local exceptions such visits are, however, to a large extent made for the purpose of visiting relatives with the participation in outdoor recreational pursuits taking place as a secondary activity.

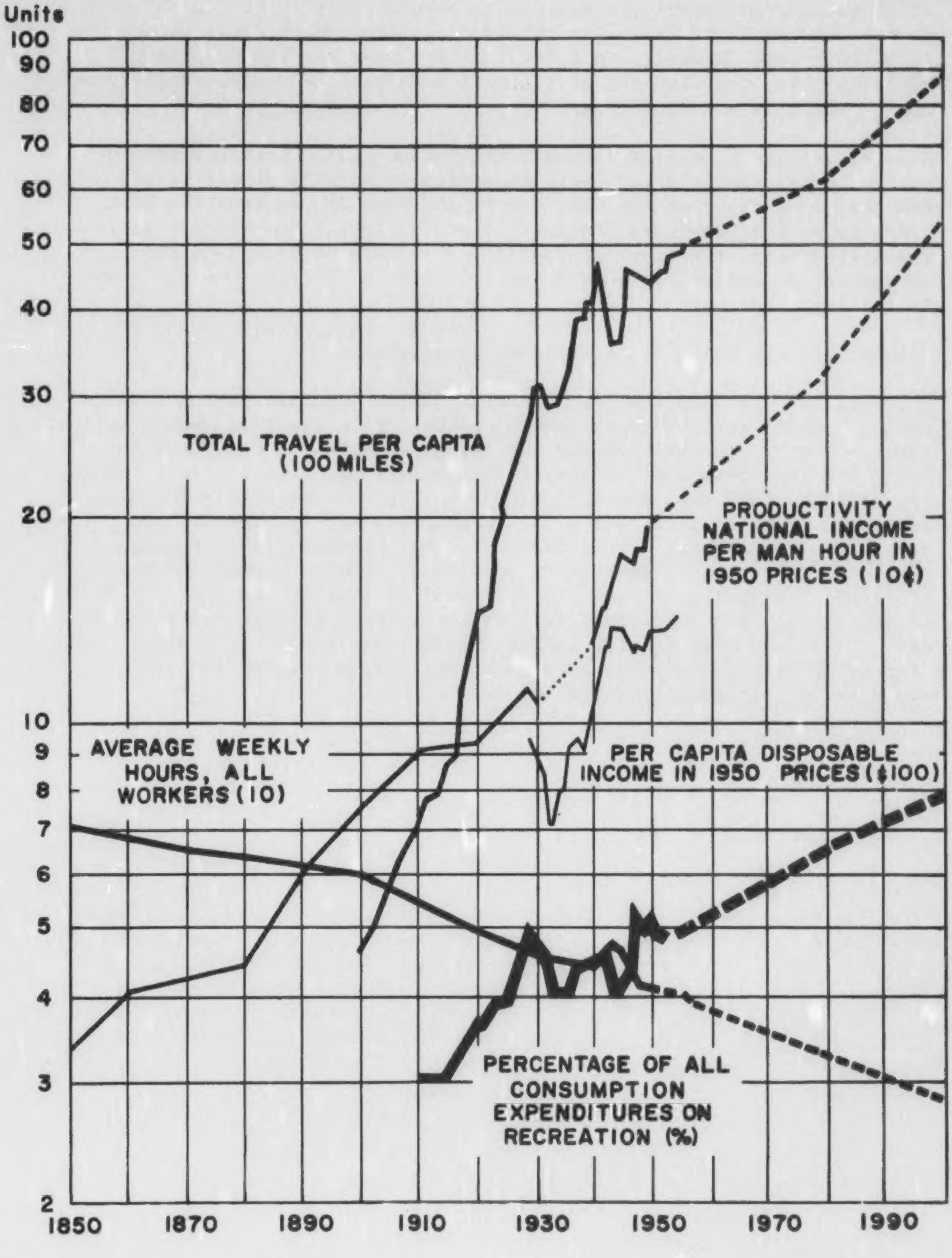
Several primary points of interest within the basin attract tremendous numbers of day-use visitors both from within and without the basin. Examples of such areas include, the island area of western Lake Erie, Cedar Point near Sandusky, Presque Island peninsula and Niagara Falls. The influence of the visiting population on water-oriented outdoor recreation is considered in the determination of demands which follows in the next chapter.

Outdoor Recreation--A Basic National Requirement

The outdoors has been very much a part of the American past and while making outdoor recreation available to the public has long been a National concern, this field of endeavor has recently taken on new dimensions. "From the beginning, one of the strongest currents in American thought has been the idea that the outdoors is a right of Americans--not only something to be enjoyed, but vital to our spirit," so states Outdoor Recreation for America. This basic feeling, coupled with the factors previously described: increasing population, both resident and non-resident; increasing income; greater mobility brought about by improved transportation and additional leisure time, means more people with more money will have more time to travel further, easier and make ever increasing use of available recreation facilities. These factors are graphically portrayed in Plate No. 4-6.

Plate No. 4-6

INCOME, TRAVEL AND LEISURE FACTORS AFFECTING THE USE OF OUTDOOR RECREATION FACILITIES, 1850-2000



SOURCE LAND FOR THE FUTURE, RFF

DEMAND FOR OUTDOOR RECREATION

In the analysis of the recreational demand in the basin, it was found that the ORRRC report presented the most applicable information. Methodology used in the determination of demand can be found in Appendix D. This method utilized participation rates which make possible the estimation of the number of occasions a person will participate in an activity over the period of a year. Because participation is at its peak for most water-oriented activities during the summer, activity days were determined for the three-month summer period as well. This method does not take under consideration the latent demand of the population.

The activities analyzed in this report are not all the recreational activities engaged in, but rather they are those considered because of their association with water, and in the case of winter sports, because of their expected expansion and probable effect upon headwater areas.

Factors Affecting Demand

As presented in the preceding chapter, the factors considered basic in an analysis of recreational demand are: population, income, leisure time and mobility. Each of these factors contributes substantially to the total network but when viewed together, there exists an interrelationship. These basic factors are, however, supplemented by others that may gain in relative importance as one approaches the microsituation. Some of these are discussed below.

Opportunity

If the opportunity for participation in a selected activity is made available, people will tend to participate more than they would otherwise. When opportunity for participation in any of the selected activities exists to some extent somewhere in the basin, the opportunity factor connotes a time-distance factor which is considered in the demand methodology and is discussed in detail in Appendix D.

Quality of Facilities

Closely allied with the above is the quality of the available facilities. In a survey for the ORRRC report, Eva Mueller and Gerald Gurin found that participation in most activities tends to increase as does the quality of the supporting facilities. The relationship is weakened, when the recreational pressures are so great that in many instances relatively poor quality facilities receive heavy usage. An example of this situation is the increasing attendance at Lake Erie beaches where warnings of poor quality water are posted.

Advertising

To carry further the idea that demand is positively correlated with availability of facilities, it may be stated that knowledge of their availability is equally important. The beneficial effect of advertising for recreational area promotion is accepted as the budgets of various state governmental tourist agencies can attest. Likewise, the value of advertising by small private enterprises has been substantiated by a recent study by the Central States Forest Experiment Station, Forest Service. [158]

Age

Age exerts a strong influence on recreational activity due to the inverse relationship that exists between age and the physical capacity for participation. As people become older, they tend to favor those activities requiring less physical effort. Outdoor Recreation is particularly the activity of the young adult (18 to 35 years); with advancing age, outdoor activity falls off steadily. See Plate No. 5-1.

Place of Residence

One's residence in relation to the urban-rural situation has obvious consequence in his propensity for recreational participation. Urban living exerts pressures upon the individual which increase his desires for a change-of-pace. The urban complex presents significant barriers to participation in that time and effort necessary to reach existing facilities is increased. Too, necessary skills become harder to acquire and urban-type entertainment often successfully competes for the use of one's leisure time.

Nevertheless, the metropolitan areas still remain highly significant in an analysis of recreational demand. As brought out in previous discussions, the vast majority of people who reside in or near these areas are generally more affluent, possess more leisure and are well served by transportation networks. Because of this, the analysis used in the report is centered mainly on Standard Metropolitan Statistical Areas in and near the basin.

Present Demand

At present, it is estimated that there are nearly 250 million activity days of demand within the basin as shown on Table No. 5-1. Forty-four percent of this total is in water-dependent activities. Due to the nature of the selected activities, the demand in the summer months is also given.

Plate No. 5-1 Water skiing, among the fastest growing of water-oriented outdoor recreational activities, is especially popular with the young adult age group. Photo courtesy Michigan Tourist Council, Lansing, Michigan.

Table No. 5-1

SUMMARY OF PRESENT WATER-ORIENTED RECREATIONAL ACTIVITIES LAKE ERIE BASIN

Activity Type	Annual Activity Days*	Summer (June-July-August) Activity Days*	Summer as a Percent of Annual
Water Dependent	108,266,000	76,344,000	70
Water-Enhanced	123,462,000	56,443,000	46
Winter Sports	13,623,000	n.a.	--
Total Water-Oriented	245,351,000	132,787,000	54

---

* To nearest thousand.

The individual activities comprising the above categories are shown in Table No. 5-2.

As noted in the preceding chapter, the basin is subject to considerable influx by nonresident visitors. However, travel out of the basin by residents is another factor to be considered. An attempt has been made in the demand methodology to account for these groups. Nonresident pressures originating from SMSA's within 125 miles of the basin have been considered, however, no valid method of considering those that come from distances farther than 125 miles was resolved.

Projected Demand

Demand for recreational activities within the basin has been projected to the year 2020. It was concluded that the ORRRC Study offered the best basis for such projections. This study, however, confined its analysis to the years 1976 and 2000, requiring extension to 2020. Both "with" and "without" opportunity projections were calculated in order to present a range of probable activity as presented in Table No. 5-3. "With opportunity" (as defined in ORRRC Report No. 26) assumes an improvement from 1960 quality and quantity of facilities on a per capita basis, while "without opportunity" assumes a continuation of 1960 quality and quantity of facilities on a per capita basis. These terms are based on nationwide definitions as to quality and quantity of facilities and have no direct application to the specific quality and quantity of facilities offered by public agencies within the basin. The use of these terms does, however, offer the opportunity to present a range in projecting the recreation demand.

Table No. 5-2.

PRESENT DEMAND FOR SELECTED WATER-ORIENTED OUTDOOR RECREATIONAL ACTIVITIES LAKE ERIE BASIN

Activity	Adjusted Annual Participation Rate [1]	Adjusted Summer Participation Rate [1]	Annual Activity Days (thousands)	Summer Activity Days (thousands)
Water-Dependent				
Swimming	5.69	4.93	48,149	41,718
Fishing [2]	4.27	2.18	36,000 [3]	18,379 [3]
Boating	2.35	1.58	19,886	13,370
Water Skiing	.29	.22	2,454	1,862
Canoeing	.14	.07	1,185	592
Sailing	.07	.05	592	423
Subtotal	12.81	9.03	108,266	76,344
Water-Enhanced				
Camping	.69	.43	5,839	3,639
Picnicking	3.88	2.49	32,833	21,071
Sightseeing	7.07	2.89	59,827	24,455
Nature Walks	2.58	.64	21,832	5,416
Hiking	.37	.22	3,131	1,862
Subtotal	14.59	6.67	123,462	56,443
Winter Sports				
Skiing	.07	--	592	--
Ice Skating	1.05	--	8,885	--
Sledding	.49	--	4,146	--
Subtotal	1.61	--	13,623	--
GRAND TOTAL	29.01	15.70	245,351	132,787

---

[1] See Appendix D.

[2] Includes ice fishing. Separate data was not available.

[3] Furnished by Bureau of Sport Fisheries and Wildlife in accordance with Section 2C of the Memorandum of Understanding of February 3, 1965, between the Bureau of Outdoor Recreation and Bureau of Sport Fisheries and Wildlife.

Table No. 5-3.

EXPECTED SUMMER (JUNE, JULY, AUGUST) PARTICIPATION IN SELECTED WATER-ORIENTED ACTIVITIES IN 2000 AND 2020, LAKE ERIE BASIN

Activity	1960 Summer Activity Days (thousands)	2000 Summer Activity Days (thousands)5/		2020 Summer Activity Days (thousands)1/	
		Without Opportunity	With Opportunity	Without Opportunity	With Opportunity
Water-Dependent					
Swimming	41,718	143,093	166,872	193,781	229,449
Fishing 2/	18,379	36,758	36,758	40,800	40,800
Boating	13,370	46,795	55,753	63,508	76,944
Water Skiing	1,862	9,012	10,725	12,587	15,157
Canoeing 3/	592	2,072	2,469	2,812	3,408
Sailing 3	423	1,480	1,764	2,009	2,435
Subtotal	76,344	239,210	274,341	315,497	368,193
Water-Enhanced					
Camping	3,639	14,301	23,472	19,632	33,389
Picnicking	21,071	52,678	65,109	68,482	87,128
Sightseeing	24,455	70,186	115,917	93,052	161,648
Nature Walks	5,416	14,569	14,569	19,146	19,146
Hiking	1,862	6,871	11,377	9,376	16,135
Subtotal	56,443	158,605	230,444	209,688	317,466
TOTAL(Water- Oriented	132,787	397,815	504,785	525,185	685,639
Winter Sports 4/	13,623	47,303	47,303	64,143	64,143

1/ 2020 figures obtained by straight line equation.

2/ Based on information obtained from Bureau of Sport Fisheries & Wildlife.

3/ Assumes same projection as "Boating."

4/ Winter participation (December, January, February). Projections for sledding and skating averaged and applied to all three activities.

5/ Projections based on data contained in Table No. 6, ORRRC Report No. 26.

These projections are based on the probable effects of previously discussed factors upon participation rates as estimated by ORRRC. The ORRRC data restricted this analysis to summer activity only, but it was deemed appropriate as the emphasis lies with water-dependent activities which are for the most part carried out in the months of June, July and August.

Zone Demands

Intensive analysis for a zone breakdown of demand was deemed unwarranted as the ORRRC data presented is not especially subject to extreme disaggregation. However, for purposes of this report, figures are presented that are believed as accurate as practical. A method similar to that used for finding the basin demand was utilized. That is, an income index was established in order to furnish an idea of the propensity for participation of the respective zone populations. Table No. 5-4 presents the findings. Methodology is in Appendix D.

Table No. 5-4

SUMMARY OF ZONE DEMANDS

	Present		2020
	Annual Activity Days	Summer Activity Days	Summer Activity Days
Zone I	103,047,000	55,771,000	287,968,000
Zone II	12,268,000	6,639,000	34,282,000
Zone III	130,036,000	70,377,000	363,389,000
Total	245,351,000*	132,787,000*	685,639,000**

---

* See totals in Table No. 5-2.
** Obtained from Column 6, Table No. 5-3.

SUPPLY OF OUTDOOR RECREATION

Recreation Resources

The Lake Erie Basin possesses several natural physical characteristics of high recreational value such as the island area in the western basin. The primary value of the basin's resources is found in their proximity to the urban population in and adjacent to the basin. This factor tends to increase their value substantially over those of a similar nature in a less populous locale. The availability of these resources for outdoor recreational pursuits is severely limited by competing uses especially in the highly urbanized portions of the basin.

Zone 1

An exceptional base for recreational development in this zone is the morainal belt of wooded hills lying along the basin boundary. With its numerous lakes, this area definitely is of a character anomalous to the remainder of the basin. The proximity of this area to the highly populous Detroit metropolitan region makes it of singular value. The State of Michigan and the Huron-Clinton Metropolitan Authority have been very active in this area, acquiring and developing lands for public recreation.

The rivers of this zone offer additional opportunity for the provision of recreational areas. Suitable sites for reservoir projects are to be found along some of them. Again, the Huron-Clinton Metropolitan Authority has been notable in utilizing this resource, having established recreational reservoirs on the Huron River and on Stony Creek, a tributary to the Clinton River.

This zone's frontage on Lakes Erie and St. Clair and the Detroit and St. Clair Rivers provides an obviously valuable asset to the area. Among the inherent problems that restrict full use of this resource is the problem of over-development along the shore. Industrial and even residential development has virtually precluded public recreation in key areas. The wastes created by these complexes have impeded recreational development in adjacent areas. Nevertheless, there are recreation areas serving the population of this basin which receive extremely high attendance due to the demand created by a high population concentration.

Zone 2

The Maumee Basin stands out as being the zone most deficient in resource base areas. Being an extremely flat and highly fertile area, the zone supports a great deal of farming activity. Recreational development has been largely confined to the available river courses, because there is no frontage on Lake Erie. Only in certain instances have sites been found suitable for large impoundments on rivers of the zone. Notable in this respect is the reservoir development by the City of Lima in Allen County, Ohio and Grand Lake in Mercer and Auglaize Counties which provide 13,500 acres of water for the patrons of St. Marys State Park. Steuben County, Indiana, abounds in natural lakes; however, the vast majority are located outside the basin.

Zone 3

Frontage on Lake Erie is this zone's major asset. It provides the base for the vast majority of the recreation that takes place within the zone. Except for Akron, Ohio, the major cities are found along the Lake Erie shore. Here again, as in Zone 1, over-development of the shoreline has greatly restricted public recreational development of this exceptional resource.

The rivers of this zone are quite short. The river valleys have not experienced development as have surrounding areas. They have, therefore, been more readily available for acquisition and development as public recreation areas. Much of the Cleveland Metropolitan Park system is located in the Rocky and Chagrin River valleys.

Topographical features of significance other than river valleys are the glaciated plateau around Akron extending into Geauga County, the plateau area in the New York portion of the basin and the escarpments where the plateau breaks into the narrow Lake Plain. Only in the plateau area are significant reservoir sites located.

Existing Recreation Areas

While the general public participates in recreational activities in many places other than designated recreational areas, it is on these designated areas that the bulk of the population must rely for satisfaction of its recreational needs. The restriction on unlimited use, of course, is primarily access. It is recognized that many private cottage owners and members of clubs and other organizations with property fronting on water have provided for their own recreational activity on an individual basis. Generally speaking, this group does not exert as great a pressure of public areas as does the general public. Of course, the nonriparian property owners and the nonmember are in the vast majority. It is for this segment of the population that public agencies and private recreational enterprises are attempting to provide recreational opportunity through selected, designated areas.

General

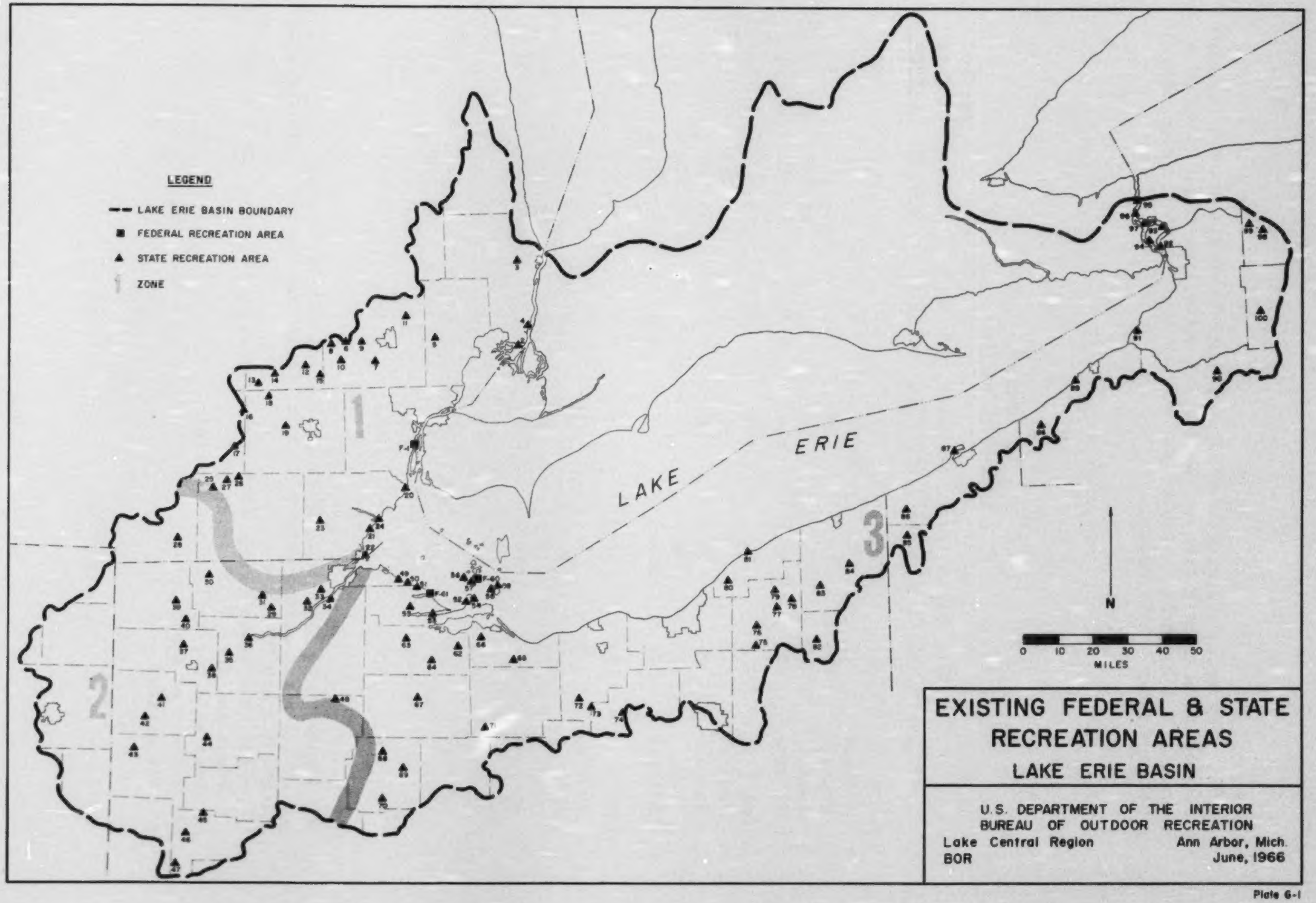
There are 259 public outdoor recreation areas in the basin where facilities for one or several general outdoor recreational activities have been developed. In addition, there are many areas within the basin which have been developed by state fish and game agencies that provide access primarily for fishing and boating. Private commercial recreational developments are quite numerous throughout the basin, and when combined with the public sector, they satisfy a great deal of the demand. Table No. 6-1 presents a summary of available data on these areas while Appendix A contains a more detailed inventory. Plates No. 6-1 and 6-2 illustrate the general location of the public areas.

Table No. 6-1

SUPPLY SUMMARY
LAKE ERIE BASIN

	No. Areas	No. water-Oriented 1/	No. with Swimming	No. on L. Erie 2/	Total Acreage	Percent of Total Acreage
BASIN	1,011	176	79	87	294,143	100
Federal	3	2	0	3	501	-- 4/
State	97	72	28	28	148,103	50
Local	159	102	51	56	83,528	29
Private	752	n.a. 6/	n.a.	n.a.	62,011	21
ZONE 1	201	62	29	24	115,903	39 5/
Federal	1	1	0	1	280	-- 4/
State	26	25	14	6	75,120	65
Local	52	36	15	17	26,606 3/	23
Private	122	n.a.	n.a.	n.a.	13,897	12
ZONE 2	189	30	3	0	35,732	12 5/
Federal	0	0	0	0	0	0
State	20	14	3	0	19,755	55
Local	21	16	0	0	6,288	18
Private	148	n.a.	n.a.	n.a.	9,689	27
ZONE 3	621	84	47	63	142,508	49 5/
Federal	2	1	0	2	221	-- 4/
State	51	33	11	22	53,228	37
Local	86	50	36	39	50,634 3/	36
Private	482	n.a.	n.a.	n.a.	38,425	27

1/ Based on provision for swimming, boating and/or fishing.
2/ Includes connecting waters-Lake St. Clair and the St. Clair, Detroit and Niagara Rivers.
3/ Based on average figure from those reporting acreages (Zone 1, 44 areas and Zone 3, 58 areas).
4/ Less than one-half of one percent.
5/ Percent of Basin total.
6/ Not available

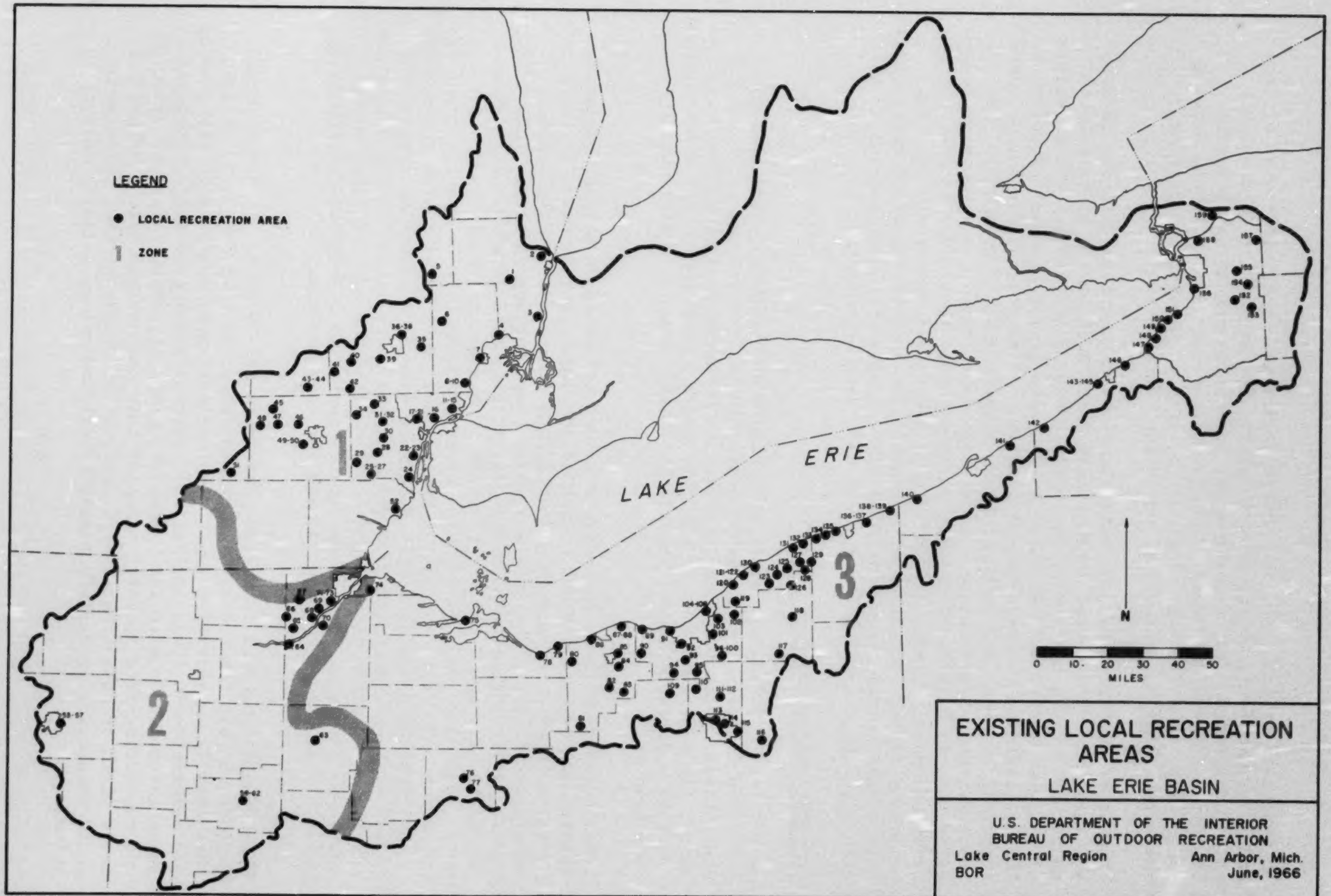

LEGEND
LAKE ERIE BASIN BOUNDARY
FEDERAL RECREATION AREA
STATE RECREATION AREA
ZONE
LAKE ERIE
1
2
3
N
0 10 20 30 40 50
MILES

EXISTING FEDERAL & STATE RECREATION AREAS

LAKE ERIE BASIN

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF OUTDOOR RECREATION
Lake Central Region Ann Arbor, Mich.
BOR June, 1966

Plate 6-1


LEGEND
● LOCAL RECREATION AREA
1 ZONE
LAKE ERIE
1
2
3
N
0 10 20 30 40 50
MILES

EXISTING LOCAL RECREATION AREAS

LAKE ERIE BASIN

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF OUTDOOR RECREATION
Lake Central Region Ann Arbor, Mich.
BOR June, 1966

Plate 6-2

As indicated on Table No. 6-1, there exists nearly 300,000 acres of land and water available to the general public for recreation in the 1,011 areas considered. Fifty-one percent of this amount is water surface. This does not consider water acreage that is not totally within a designated area, that is, water that may be only contiguous to the area. Therefore, this percentage is considered conservative.

It must be realized that the total land area under consideration is not all available for general recreational use. Much of it has been left untouched for the purpose of providing buffer zones and for the provision of activities that are extensive in the nature of their use and enjoyment. This is definitely a recommended practice. However, in this basin, where recreational areas are within day-use range of the large metropolitan centers, intense pressure is exerted upon such areas. Consequently, every effort should be made to develop existing areas to provide as much opportunity as possible without sacrificing the quality necessary for the enjoyment of the recreation experience. The several state and metropolitan park systems within the basin have made significant contributions in this area with their establishment of outdoor nature centers.

Swimming and Swimming Areas

As previously indicated, water temperature and climatic conditions make Lake Erie better suited to support swimming activity than any of the other Great Lakes. With the heavy population concentrations along the southern shore, the available beaches are very heavily used during the summer season. The lake's northern shore, located in Canada, supports heavy use at available beaches.

Total demand for these beach areas is not reflected in present visitation figures for several reasons. Much of the demand for swimming is being met by areas in private ownership that afford access only to the property owners and to those the owners wish to grant the opportunity. Industrial, utility and transportation development has limited access in many areas where the need for access is greatest. Poor water quality is felt to deter attendance on many swimming areas fronting Lake Erie and connecting waterways. In fact, the publicity this has received virtually throughout the Nation has an incalculable deterrent effect on potential users. The recent past has witnessed a lowering of the Great Lakes' levels which has adversely affected visitation due to the creation of mud flats and shallows. However, visitation remains generally high at most beach areas which reflects the tremendous demand for this activity.

ORRRC Report Number 4 indicated that there are 29 miles of natural beach included in the total United States shoreline of Lake Erie. It is felt that this is conservative due to the definition of beach which was used by the Commission in their evaluation. Several areas generally recognized as beach are not accounted for. However, using the ORRRC figure of 29 miles and concluding from specific examples that the average beach on Lake Erie has a width of approximately 130 feet, it is estimated that these areas could theoretically satisfy nearly 17 million annual activity days of swimming.

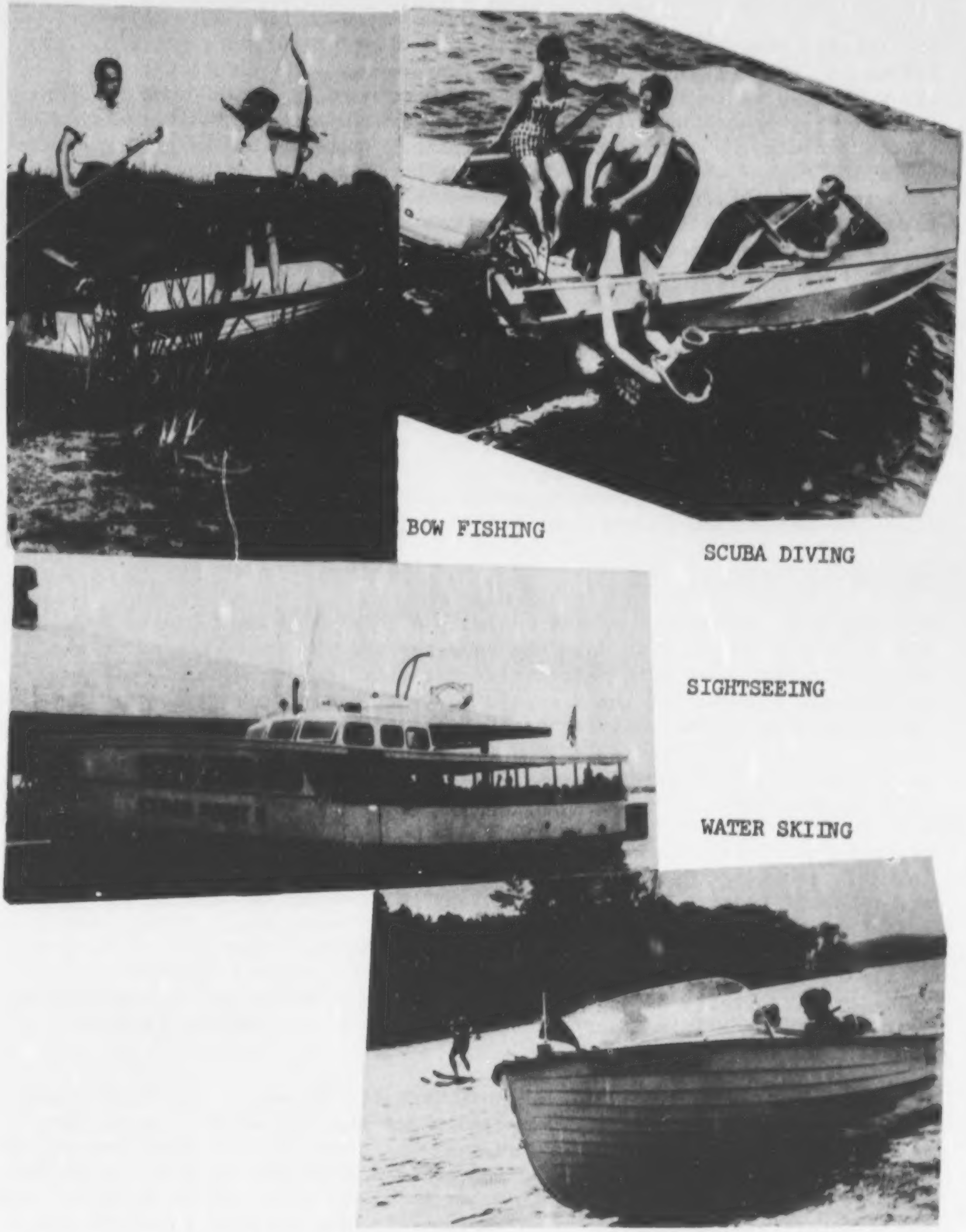
The inland lakes in Zone 1 support a great deal of swimming activity. As indicated in Appendix A, there are 19 such areas. Inland lake beaches are well adapted to swimming as their waters warm up sooner than the Lake Erie waters, remain warm longer and are less subject to erosion, sedimentation and other adverse effects of storms. While inland lakes are infrequent in Zones 2 and 3, those which do afford an opportunity to swim experience a tremendous attendance for their size. As an example, Hinkley Lake Park near Cleveland had a 1963 attendance of 1,499,100. Of this number it is estimated that 375,000 people went swimming. This activity occurs on a beach which is only about one acre in size.

There are no known public swimming facilities in the Lake Erie Basin on rivers or streams tributary to the lake except in areas of impoundment or natural inland lake. Stream beach areas are generally hard to maintain and dangerous because of underwater changes in the profile caused by currents. Public beaches of the basin are estimated to provide about 16 million annual activity days of swimming. Thus, the remaining demand must be satisfied at private swimming pools. Given full development and amelioration of some of the existing problems, all beach areas would satisfy less than one-half of the present total demand for swimming.

Boating and Boating Areas

Boating is an extremely popular activity within the basin. Lakes Erie and St. Clair, of course, form the base for the vast majority of boater activity. The lakes being attractive for body contact water activities undoubtedly account for their popularity with boaters as more activities can be engaged in than boating per se. That is, because the family can expect to swim, fish and water ski during the outing, boating will be used as a means of enjoying these activities as well as that of boating for general enjoyment. See Plate No. 6-3. Many other factors account for the vast amount of boating done in the area. Because of the population concentrations along the shore, the demand for all water-oriented activities is extremely large. The proximity of a water body large enough to permit all types of boating acts as a stimulant to increase the desire for participation. If recreation opportunity exists a very short distance away, families tend to sacrifice other items in order that they may purchase the necessary equipment to take advantage of the opportunity offered. The water quality problems that curtail body contact activities do not affect boating as much. This aspect will be treated in the section on water quality influence.

One deterrent to boating activity on Lake Erie, as on all the Great Lakes, has been the cyclical low water period which has adversely affected many marina-type facilities along the shore. These effects are more pronounced in Lake St. Clair and the western end of Lake Erie where off-shore gradients are slight. The United States Army, Corps of Engineers is studying a Great Lakes water level regulation plan whereby the low and high water fluctuations might be reduced. The Bureau of Outdoor Recreation is working with the Corps of Engineers on this study evaluating the effect of the extremes



BOW FISHING

SCUBA DIVING

SIGHTSEEING

WATER SKIING

Plate No. 6-3 Boating is often done in connection with other water oriented outdoor recreation activities. Bottom photo courtesy Michigan Tourist Council, other photos courtesy Cleveland Plain Dealer, Cleveland, Ohio.

in fluctuation on outdoor recreation. At this time, the water levels in all the Great Lakes are beginning an upward trend after reaching particularly low stages throughout the last several years.

Wind-caused turbulence is a severe problem on Lakes Erie and St. Clair. Shallow water is responsible for this severity.

As indicated on page 3-4 of this report, the frequency with which small craft warnings are issued for Lake Erie influences to a considerable degree the opportunity for participation in boating activities on the lake. Due to the orientation of the lake, hazardous lake conditions most often occur when the wind is blowing from a northerly direction. There are often periods of several days duration when no activity involving boats can be carried on except in leeward coves and bays.

Another factor influencing boating activities on the lake is the presence of an Armed Forces firing range in the western basin. This range covers an area of about 160 square miles between Maumee Bay and Catawba. The range is presently administered by the Ohio National Guard and public use of this portion of the lake is restricted at certain times.

Of major significance in Lake Erie is the group of islands in the western end of the lake and the waters around the Catawba Peninsula. The proximity of this area to the metropolitan centers of Cleveland and Toledo enhances it value. Access to the Catawba area is excellent via the Ohio Turnpike which comes within 20 miles of the peninsula.

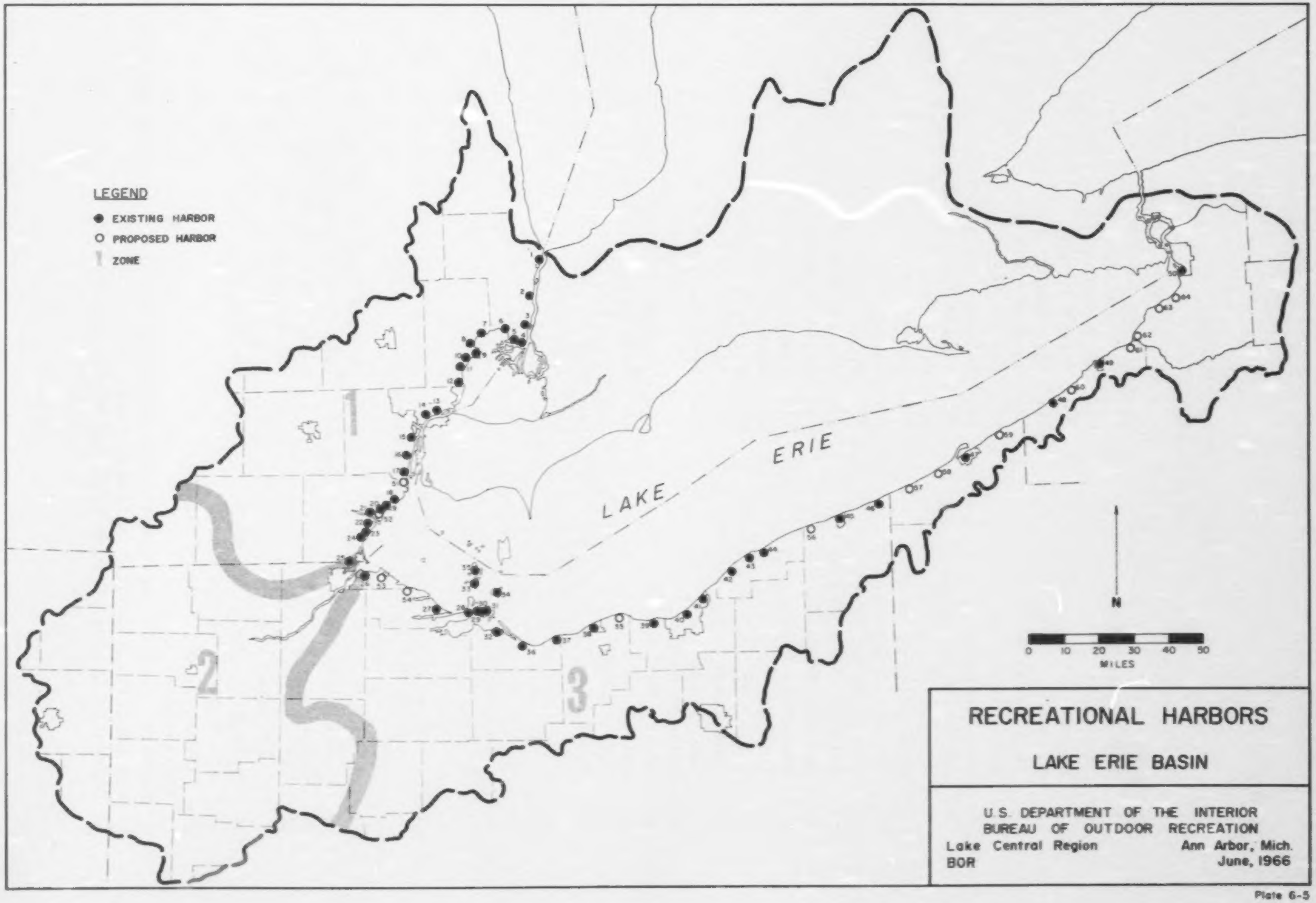
The natural lakes and the reservoir impoundments of Zone 1 support very heavy boating use. Public access is provided at 14 percent of the lakes.

Zone 2, without benefit of the Lake Erie shore, has few areas available for boating except near the mouth of the Maumee River, where boat access to the lake is possible. These few areas are found at impoundments near Lima, Ohio, and Ft. Wayne, Indiana, and at several points along the Maumee River where launching facilities are available. The rivers in this zone, as well as the others, are generally too shallow for all but the smallest craft.

Areas in Zone 3 which support considerable activity include the lakeshore in general and reservoir impoundments in the Cleveland-Akron area and the Niagara River.

Indeed, boating is pursued wherever sufficient water is available and access is provided. Access points are provided by various levels of government and the private sector on many of the inland lakes. Access points range from small tracts that provide only launching ramps to marina developments that provide a full complement of boating services. See Plate No. 6-4. Appendix A indicates the public designated areas that provide boating access. Plate No. 6-5 shows harbor developments along the shore of Lake Erie which provide recreational boating facilities. Table No. 6-2 lists the facilities located on this plate. See also Plate No. 6-6.

Plate No. 6-4 Boat launching ramp on a tributary to Lake Erie. Such facilities permit use of the Lake by boaters who have no permanent mooring on the Lake. Photo courtesy Cleveland Metropolitan Park District, Cleveland, Ohio.


LEGEND
● EXISTING HARBOR
○ PROPOSED HARBOR
ZONE
1
2
3
LAKE ERIE
N
0 10 20 30 40 50
MILES

RECREATIONAL HARBORS

LAKE ERIE BASIN

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF OUTDOOR RECREATION
Lake Central Region Ann Arbor, Mich.
BOR June, 1966

Plate 6-5

Table No. 6-2

RECREATIONAL HARBORS
LAKE ERIE BASIN

Michigan

1. Port Huron *
2. St. Clair
3. Marine City
4. Algonac
5. Bell Harbor
6. Fair Haven
7. New Baltimore
8. Anchor Bay Gardens
9. Clinton River *
10. Metropolitan Beach
11. St. Clair Shores
12. Grosse Point Farms
13. Detroit Civic Center
14. Detroit Memorial
15. Wyandotte
16. Trenton
17. Gibraltor
18. Swan Creek
19. Stony Creek
20. Detroit Beach
21. Monroe Harbor 1/
22. Bolles Harbor *
23. Otter Creek
24. Toledo Beach

Ohio

25. Ottawa *
26. Toledo Harbor
27. Port Clinton *

Ohio (con.)

28. Catawba Island
29. West Harbor *
30. Middle Harbor
31. East Harbor *
32. Sandusky Bay *
33. Put-in-Bay *
34. Kelleys Island *
35. Middle Bass Island
36. Huron *
37. Vermillion
38. Lorain *
39. Rocky River
40. Cleveland * 2/
41. Euclid Creek
42. Chagrin River *
43. Mentor Harbor*
44. Fairport Harbor *
45. Ashtabula Harbor *
46. Conneaut Harbor *

Pennsylvania

47. Erie Harbor

New York

48. Barcelona
49. Dunkirk *
50. Buffalo *

Other - Locations being studied by the Corps of Engineers as areas of possible improvement for recreational craft.

51. Huron River, Michigan
52. Sterling State Park, Michigan
53. Cooley Creek, Ohio
54. Turtle Creek, Ohio
55. Avon Lake, Ohio
56. Geneva-on-the-Lake, Ohio
57. Elk Creek, Pennsylvania
58. Walnut Creek, Pennsylvania
59. Orchard Beach, Pennsylvania
60. Lake Erie State Park, New York
61. Silver Creek, New York
62. Cattaraugus Creek, New York
63. Sturgeon Park, New York
64. Hamburg Park, New York

---

* Harbors at which improvement for recreational craft is being studied.

1/ Few facilities for recreational craft.

2/ Edgewater Lagoon, Gordon Park and White City Park

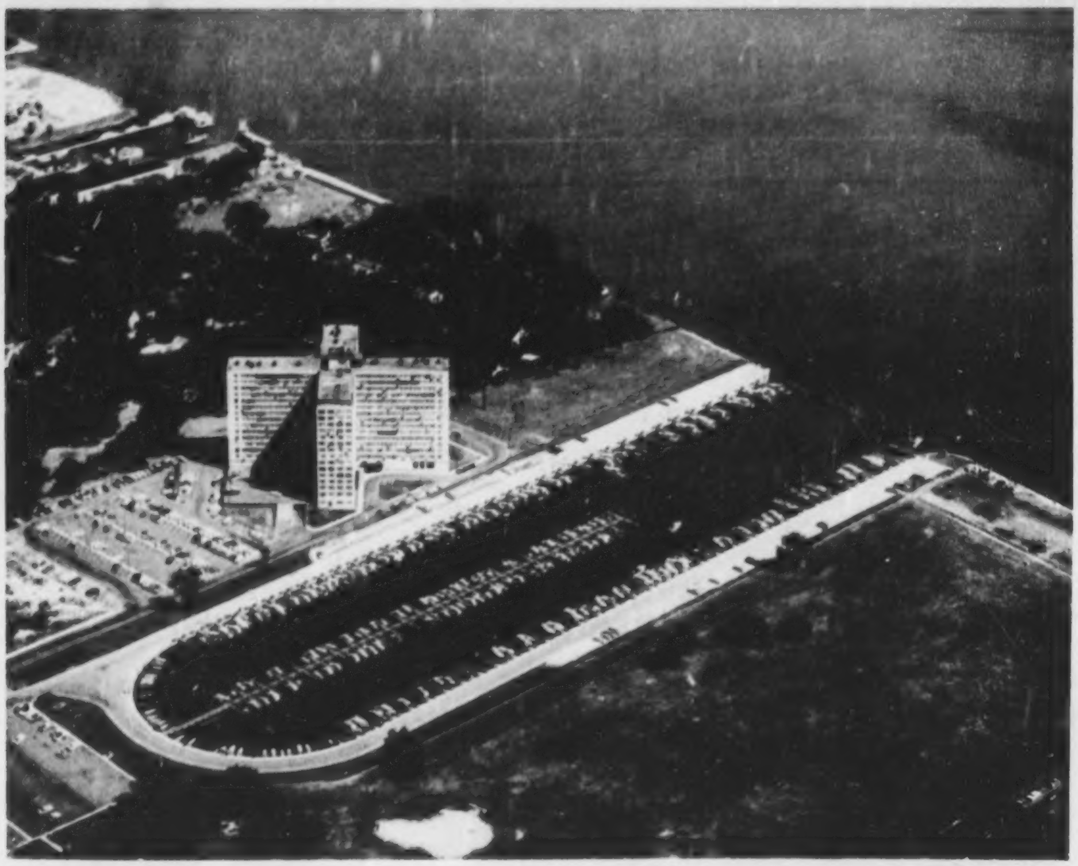


Plate No. 6-6 Memorial Park Marina, Detroit; one of the recreational harbors in the Lake Erie Basin serving the needs of the metropolitan boater. Photo courtesy Michigan State Waterways Commission, Detroit, Michigan.

Canoeing

Canoeing is a special type of boating activity that adolescents and young adults enjoy although participation is certainly not limited to these groups. Canoeing opportunity is limited in the Lake Erie Basin to a large extent because of the intensive metropolitan and industrial development. Since this activity relies heavily upon aesthetic values, the popularity of certain rivers as canoe routes decreases as development increases. River valleys often remain untouched in the midst of urban development. A buffer strip of trees and other dense vegetation is sometimes left on the banks, which effectively shields adjacent areas. This type of natural setting enhances the canoeing experience. Here, more than in other types of boating, water quality plays an important role due to the close association of the participants and the water.

At present, approximately 300 miles of streams have been designated by the respective state conservation agencies as canoe routes within the basin.

The extent of these routes is as follows:

Zone 1

Huron River --Proud Lake State Recreation Area, Oakland County to Lake Erie.

Raisin River--Clinton to Deerfield, Lenawee County.

Zone 2

Maumee River--Oakwood, Auglaize River, Paulding County to Lake Erie.

Zone 3

Sandusky River--Upper Sandusky, Wyandot County to Sandusky Bay.

Cuyahoga River--Burton, Geauga County to State Route 17, Cuyahoga County.

Sailing

Sailing is a popular activity on many of the inland lakes of the basin. In addition, Lakes St. Clair and Erie and their connecting waters are considered desirable sailing areas by yachtsmen. Most of the yacht clubs in the cities along Lake Erie hold sailing regattas. See Plate No. 6-7.

Plate No. 6-7 Sailing regatta on Lake Erie off Cleveland, Ohio. Sailing is a popular activity on Lakes Erie and St. Clair. Photo courtesy Cleveland Plain Dealer, Cleveland, Ohio.

Fishing and Fishing Areas

Following swimming, fishing is the next most popular form of water-oriented activity. Fishermen can be found virtually everywhere there is water. This report will not attempt an intensive evaluation of fishing activity, either sport or commercial, since reports being prepared by the United States Fish and Wildlife Service for the Federal Water Pollution Control Administration will cover this subject. This report is, however, concerned with access points to water as these access points are used by persons other than fishermen.

As previously indicated in Table No. 3-4, public access is possible at 295 inland lakes. In addition, access is provided by designated recreational areas having water frontage as well as other public facilities such as piers, seawalls, breakwaters and boat basins along Lakes Erie and St. Clair. See Plate No. 6-8.

The right of the public to gain access to bodies of water depends principally on whether or not the waters or shorelines in question are in public ownership. Laws and public rights regarding navigation vary from state to state. However, navigable waters are generally considered to be public property to be used not only for navigation but also for other uses in the public interest including recreation. Where the public does have a right of access, the right must be exercised in such a manner that no abuse against property ownership rights is committed.

Other Activities

The activities discussed before are those dependent upon water surface for their existence. The following activities are not dependent upon water surface but are considered to be enhanced by the presence of water.

Most recreational activities are more enjoyable in beautiful, natural surroundings. The following activities could be pursued virtually anywhere land is available, however, their popularity in certain locations can definitely be related to the presence of water.

The ORRRC report indicates picnicking is the most preferred activity for a day's outing. Perhaps it is popular because it involves very little expense other than travel costs and requires a minimum of equipment and ability. Too, participation is not limited to any age group. It is not surprising that this activity is provided for more often in public recreation areas than any other. Appendix A indicates those areas providing public picnicking facilities in the Lake Erie Basin.

Camping is an activity rapidly growing in popularity. This is due to the equipment available which provides maximum convenience and to the widespread presence of well-developed campgrounds. In the basin camping facilities are rather limited because public recreation agencies have concentrated on meeting the day-use needs which predominate. The public areas which provide camping facilities can be found in Appendix A.

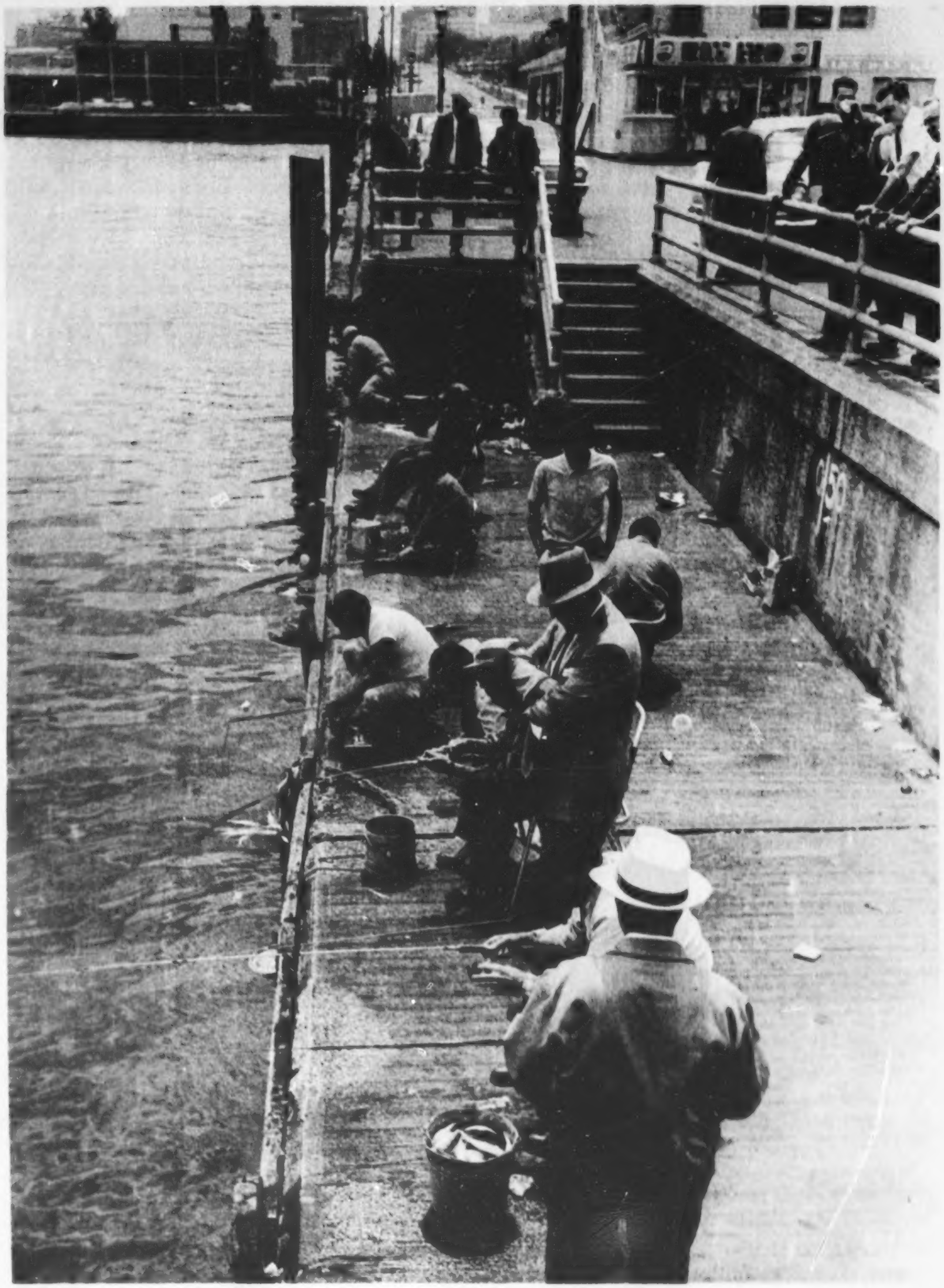


Plate No. 6-8 Fishing provides many hours of recreational enjoyment, both active and passive, to young and old alike. Photo courtesy Cleveland Plain Dealer, Cleveland, Ohio.

Sightseeing is an extremely popular activity within the basin. The many highways and roads throughout the basin afford opportunity for participation. However, due to private developments, much of the value of the Lake Erie shoreline as a sightseeing attraction has been lost. Additional access points and vistas should be provided at selected areas and sightseeing as a recreational activity should be given full consideration in future highway development.

Nature walking, like sightseeing does not necessarily require specific facilities. Since nature walking is chiefly an aesthetic experience, the accent must be placed upon quality. This is an activity that is suitable for participation by all age groups. The several state and metropolitan park agencies in the basin have provided many excellent areas for nature walks.

Ice fishing is among the most popular of winter sports in the Lake Erie Basin. The inland lakes of Zone 1 and the protected bay areas of Lakes St. Clair and Erie abound with ice fishermen in season. For example, a 1958-1959 survey by the Ohio Department of Natural Resources indicated a total of 10,600 ice anglers fished more than 66,000 hours during the season in the island region of western Lake Erie. [145] See Plate No. 6-9.

A popular winter recreation activity on Lake St. Clair is ice boat sailing and racing.

Skiing as a winter sport activity is somewhat limited in the basin due to insufficient snowfall and a lack of suitable topography. However, some suitable sites have been developed in hilly portions of Zone 1 and the dissected plateau area in New York. The New York area enjoys an abundant snowfall resulting from moisture laden winds blowing across Lake Erie during the winter. With the extensive ski developments in northern Michigan, many enthusiasts travel outside the basin in pursuit of this activity. Ice skating and sledding are enjoyed throughout the basin in many city parks and other open areas.

Private Recreation Development

Private lands are an important segment of the total supply of outdoor recreation resources. See Plate No. 6-10. The private sector physically increases the effective supply of the recreational resource base of an area. This is certainly true in the Lake Erie Basin. A lack of sufficient data makes it impossible to estimate its effect in the total outdoor recreational picture. In areas where public resources are limited, the importance of the private sector is increased.

Improper management, lack of advertisement and often inability to secure sufficient funds for capital investments serve to diminish the attractiveness of private recreation development. As a result, the situation increases the competitiveness of the developed public areas.

Plate No. 6-9 Ice fishing, a popular winter sport in the Lake Erie Basin. Photo courtesy Cleveland Plain Dealer, Cleveland, Ohio.

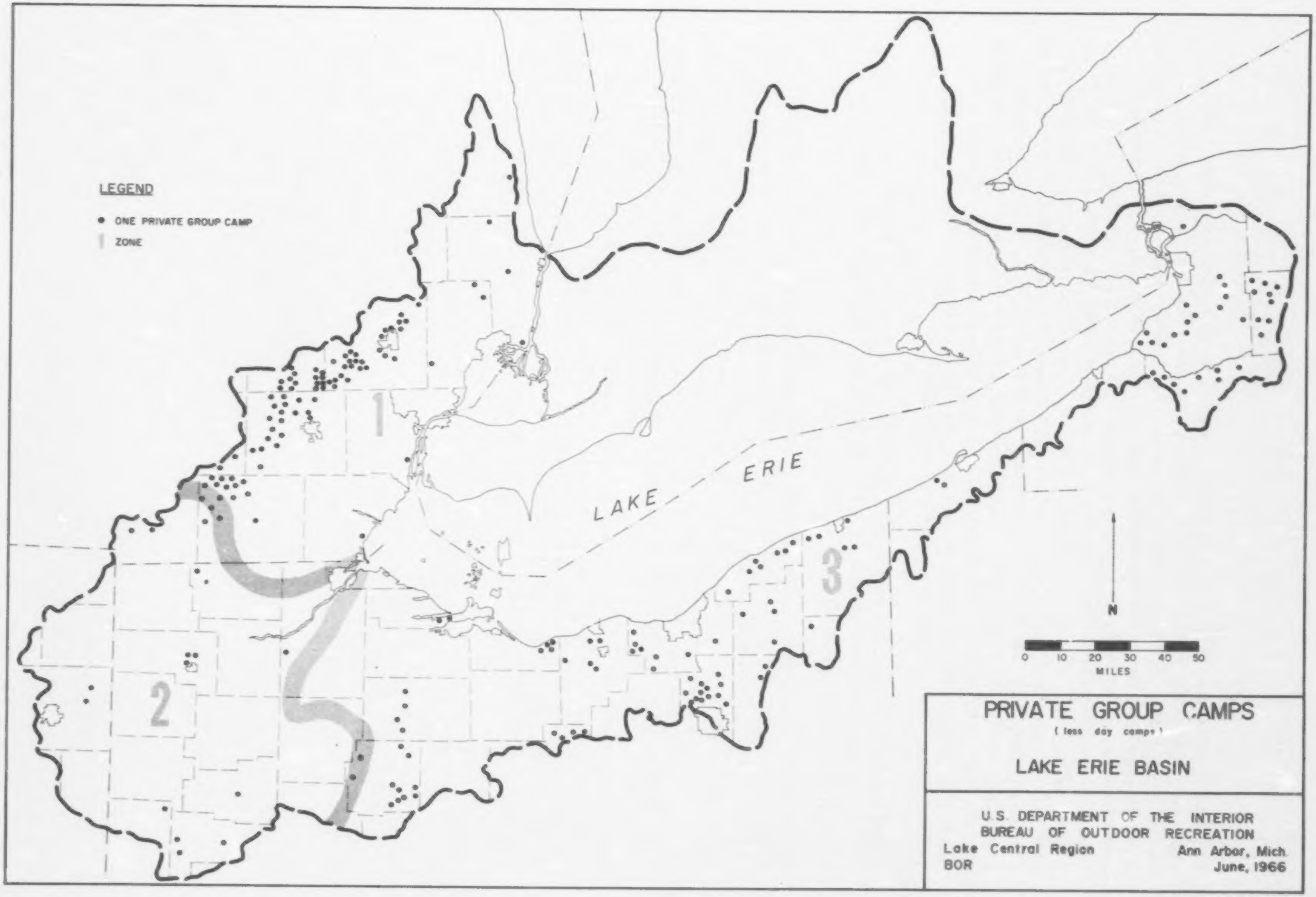
Plate No. 6-10 An aerial view of the Cedar Point recreation area, a large privately owned recreational complex on Lake Erie in Ohio which is helping to meet the demand for swimming, boating and other outdoor recreational activities in the Basin. Photo courtesy Cleveland Plain Dealer, Cleveland, Ohio.

Private developments for recreation cover a wide spectrum. Many offer a wide variety of activities while others promote only selected ones. Facilities range from luxurious resorts to rundown shanties selling bait. A survey by the Economic Research Service, United States Department of Agriculture, produced activity information which is considered illustrative of the industry. [92] The most frequently offered activities were found to be, in order; swimming, fishing, boating, hunting, picnicking and winter sports. Most enterprises are owned by individuals or families although many are owned by companies and organizations. The National Association of Soil and Water Conservation Districts, in cooperation with the United States Soil Conservation Service, has recently conducted a detailed inventory of private recreation enterprises. The following tables were in part derived from this data.

Plates No. 6-11 and 6-12 portray the distribution of private campgrounds and of organizational group camps. Tables No. 6-3 and 6-4 summarize this information by zone.

Despite its problems, the private sector will without doubt remain an important asset in the provision of outdoor recreation opportunity. With the extremely diversified interests of the general public, specialized pursuits are many. Oftentimes, the provision of marinas, snow skiing facilities and outdoor amusement facilities is not considered to be in the realm of the public sector, and it is, therefore, highly appropriate that the private sector be encouraged to provide the necessary opportunity.

Public development alone cannot hope to satisfy the tremendous demands in evidence today and those to be expected in the future. Optimum development is required in order that these demands be satisfied; and optimum development calls for action and coordination by both the public and private sectors in order to bring about a complementarity in development.


LEGEND
● ONE PRIVATE GROUP CAMP
ZONE
1
2
3
LAKE ERIE
N
0 10 20 30 40 50
MILES

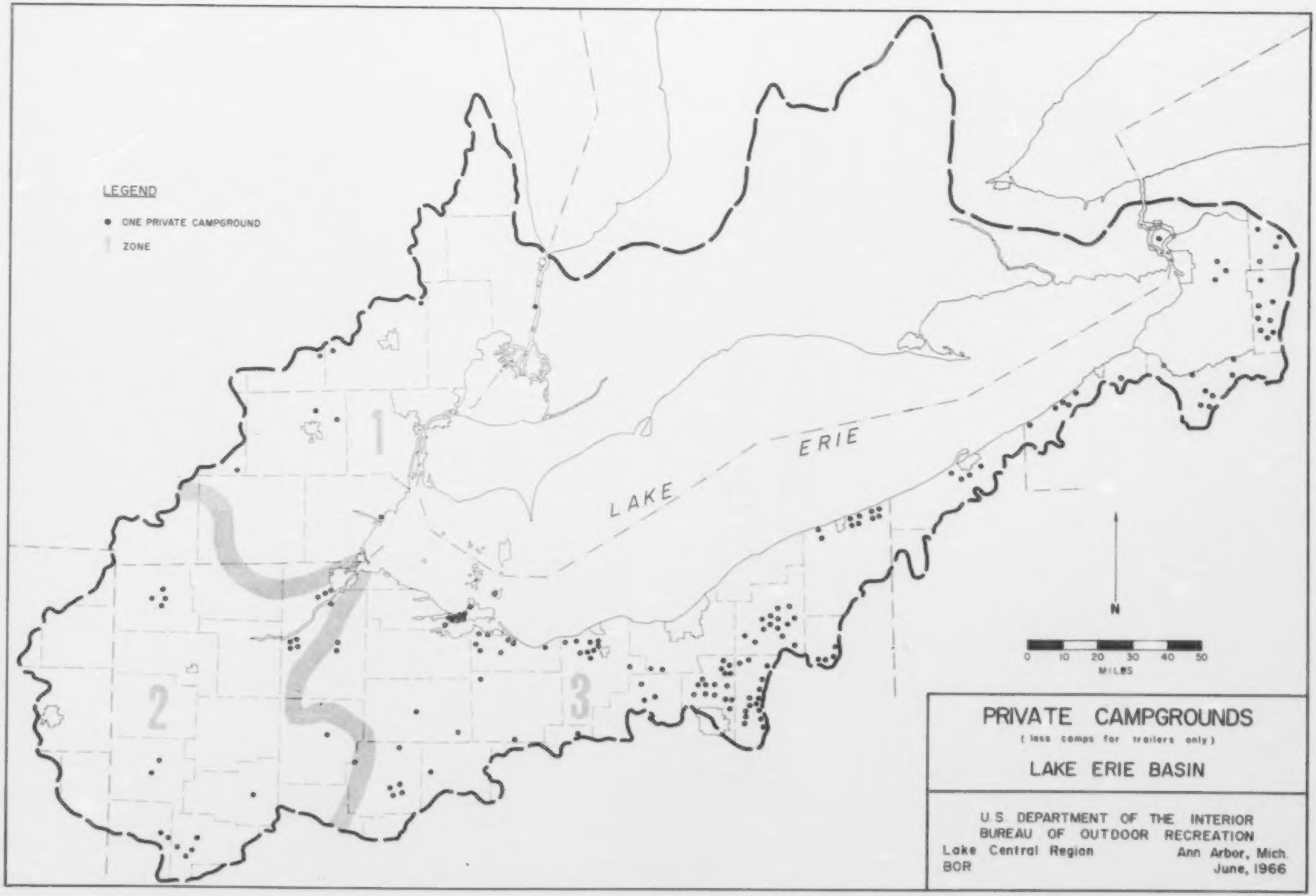
PRIVATE GROUP CAMPS

(less day camps)

LAKE ERIE BASIN

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF OUTDOOR RECREATION
Lake Central Region Ann Arbor, Mich.
BOR June, 1966

Plate 6-11


LEGEND
● ONE PRIVATE CAMPGROUND
ZONE
LAKE ERIE
1
2
3
N
0 10 20 30 40 50
MILES

PRIVATE CAMPGROUNDS

(less camps for trailers only)

LAKE ERIE BASIN

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF OUTDOOR RECREATION
Lake Central Region Ann Arbor, Mich.
BOR June, 1966

Plate 6-12

Table No. 6-3.

DISTRIBUTION OF PRIVATE GROUP CAMPS

Zone	Campgrounds	Average Capacity 1/	Approximate Total Capacity	Number Reporting
Zone 1	88	103	9,064	88
Zone 2	16	445	7,120	11
Zone 3	101	128	12,928	64
Basin	205	142	29,112	163

1/ Average capacity was computed from camps reporting capacities.

Sources: 1963 Directory of Accredited Camps for Boys and Girls, American Camping Association.

Ohio's Private Recreation Enterprises, Central States Forest Experiment Station, Forest Service.

Directory of Summer Camps for Children, Department of Social Welfare, State of Michigan, 1963.

Table No. 6-4.

DISTRIBUTION OF PRIVATE CAMPGROUNDS

Zone	Campgrounds	Average Capacity 1/	Approximate Total Capacity	Number Reporting
Zone 1	8	127	1,016	3
Zone 2	22	122	2,684	9
Zone 3	186	73	13,578	62
Basin	216	80	17,278	74

1/ Average capacity was computed from campgrounds reporting capacities.

Sources: Campground Directory, American Automobile Association.

Campground Atlas of the United States and Canada, Alpine Geographical Press, Champaign, Illinois, 1964.

Rand McNally Campground Guide, 1960.

Michigan Campground Guide, fourth edition.

PROPOSED AND POTENTIAL RECREATION AREAS

In order to provide additional recreation opportunity for the basin residents and those nonbasin residents using basin facilities, many agencies have made proposals to expand their existing lands and facilities. The following discussion will identify known proposals and also those areas where recreational opportunity exists as a potential.

Definitions are in order for the terms "proposed" and "potential." Proposed areas are those for which action toward acquisition has been initiated while potential areas have only been recognized by some agency as important and no formal action has been undertaken.

Most of the areas shown on Plate No. 7-1 and listed in Table No. 7-1 were reported by the respective state and local agencies in a recently completed Bureau of Outdoor Recreation Nationwide Survey. Others have their source in various county and regional recreational land plans. The areas shown are new areas and are not contiguous with existing recreational tracts. Those existing areas where additional lands are proposed are listed in Table No. 7-2.

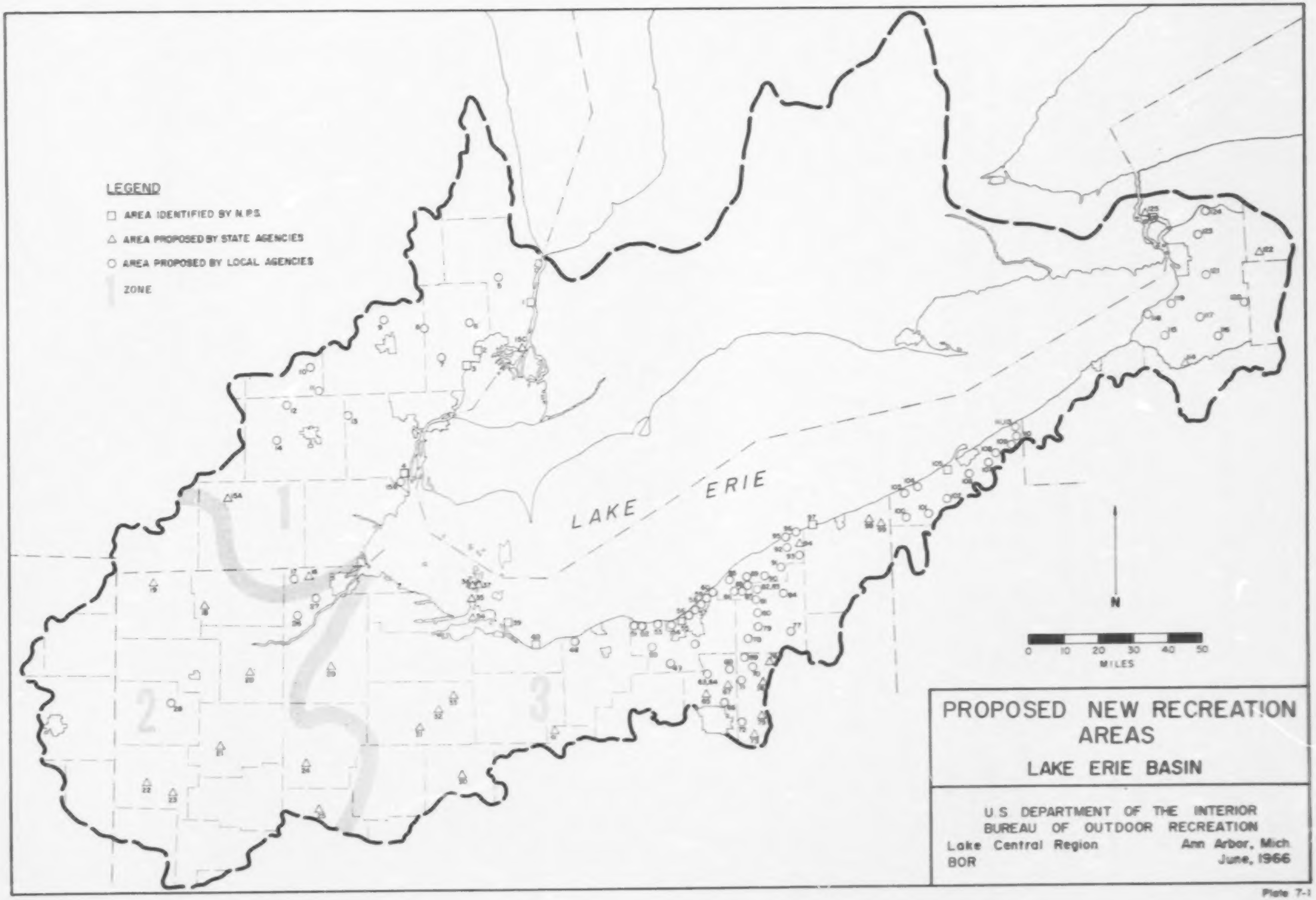
The Ohio Department of Natural Resources recently has prepared a recreational study of the Maumee, Tiffin and Auglaize River valleys. The resulting plan calls for recreational development of 31 square miles of land in the basins. The development, it is reported, would satisfy most of the recreation needs of the valley through the year 2000. The plan proposes 23 recreation sites along the rivers in addition to those already in existence. Many of these additional sites will be of a historical nature.

Specific areas offering recreational potential along the shoreline of Lake Erie and the connecting waterways were identified by the National Park Service in a survey conducted in 1958. 130/ The report identified several areas of potential recreational value in the area under study here. Their recommendations are outlined below.

1. St. Clair South - This area on the St. Clair River would be particularly well suited for a roadside park development and as an access point for fishermen and boaters. A primary attraction is that afforded by the Great Lakes' shipping lane which is just off shore. Forty-five acres with .8 miles of shoreline were recommended for public acquisition.

2. Shoreline east of Selfridge Air Force Base - This area is contiguous with the Air Force Base and is a marshy area with some beach area.

3. Shoreline west of Metropolitan Beach - This is an undeveloped strip one-third of a mile in length.


LEGEND
□ AREA IDENTIFIED BY N.P.S.
△ AREA PROPOSED BY STATE AGENCIES
○ AREA PROPOSED BY LOCAL AGENCIES
ZONE
LAKE ERIE
1
2
3
N
0 10 20 30 40 50
MILES

PROPOSED NEW RECREATION AREAS

LAKE ERIE BASIN

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF OUTDOOR RECREATION
Lake Central Region Ann Arbor, Mich.
BOR June, 1966

Plate 7-1

Table No. 7-1

PROPOSED RECREATIONAL AREAS
LAKE ERIE BASIN

Map No.	Name or Location of Area	County	Acreage
	ZONE 1		
	MICHIGAN		
1	St. Clair	St. Clair	45
2	Selfridge Air Force Base	Macomb	n.a.
3	Metropolitan Beach	Macomb	n.a.
4	Milleville Beach	Wayne	n.a.
5	Belle River	St. Clair	3,000-10,000
6	North Branch Clinton River	Macomb	1,000-5,000
7	Utica Metropolitan Parkway	Macomb	500-1,000
8	Rochester-Utica	Oakland-Macomb	1,000-2,000
9	Bushman-Vorhies Lake	Oakland	1,000-5,000
10	Ore Lake	Livingston	1,000-3,000
11	Nickwagh-Tobin Lake	Livingston	1,000-4,000
12	Arms Creek	Washtenaw	1,000-5,000
13	Territorial Hill	Wayne-Washtenaw	1,000-4,000
14	Mill Creek	Washtenaw	2,000-5,000
15A	Cambridge State Historical Pk	Lenawee	3,000
15B	Pointe Mouille	Wayne	500-1,000
15C	Gull Island	St. Clair	n.a.
	OHIO		
16	Spencer Township	Lucas	50
17	Richfield Township	Lucas	168
	ZONE 2		
	OHIO		
18	German Township	Fulton	70
19	Bridgewater Township*	Williams	400
20	Monroe Township*	Henry	100
21	Sugar Creek Township*	Putnam	100
22	York Township-West*	Van Wert	40
23	York Township-East*	Van Wert	100
24	Orange Township*	Hancock	100
25	Blanchard Township*	Hardin	100
26	Swanton Township	Lucas	754
27	Maumee	Lucas	99
28	Paulding	Paulding	1,550

Table No. 7-1 (con.)

Map No.	Name or Location of Area	County	Acreage
	ZONE 3		
	OHIO		
29	Liberty Township*	Wood	100
30	Bucyrus*	Crawford	16
31	Tiffin*	Seneca	33
32	Clinton-Scipio*	Seneca	360
33	Green Springs*	Seneca	220
34	Danbury Township	Ottawa	80
35	Catawba Township*	Ottawa	5
36	Put-in-Bay (1) *	Ottawa	50
37	Put-in-Bay (2) *	Ottawa	750
38	Kelleys Island	Erie	670
39	Cedar Point	Erie	325
40	Plum Brook	Erie	1,400
41	Ruggles Township	Ashland	80
42	Camden*	Lorain	10
43	Kipton*	Lorain	166
44	Wellington	Lorain	1,113
45	Oberlin	Lorain	832
46	Brownhelm	Lorain	379
47	Strongville	Lorain	724
48	Median County	Medina	1,420
49	North Royalton	Cuyahoga	n.a.
50	Lake Abram	Cuyahoga	n.a.
51	Cahoon Park	Cuyahoga	16
52	Westlake Road	Cuyahoga	n.a.
53	Rocky River	Cuyahoga	n.a.
54	Perkins Beach	Cuyahoga	n.a.
55	Cleveland Lake Front	Cuyahoga	n.a.
56	East 40th Street	Cuyahoga	n.a.
57	East 55th Street	Cuyahoga	n.a.
58	East 140th Street	Cuyahoga	n.a.
59	Neff Road	Cuyahoga	n.a.
60	Euclid	Cuyahoga	n.a.
61	Brecksville	Cuyahoga	n.a.
62	Valley View	Cuyahoga	n.a.
63	Boston Township	Summit	1,220
64	Sagamore Hills Township	Summit	460
65	Richfield Township	Summit	200
66	Cuyahoga	Summit	200
67	Boston Township	Summit	230
68	Twinsburg	Summit	n.a.
69	Aurora Pond	Portage	2,760
70	Mantua	Portage	950

Table No. 7-1 (con.)

Map No.	Name or Location of Area	County	Acreage
71	Schweitzer	Portage	1,720
72	Kent	Portage	625
73	Bird	Portage	25
74	Reardon	Portage	35
75	Kent*	Portage	85
76	Mantua Township	Portage	55
77	Fern Lake	Geauga	n.a.
78	Bainbridge Township	Geauga	1,120
79	Russell Township	Geauga	1,230
80	Munson Township	Geauga	1,240
81	Mulberry Road	Geauga	790
82	Holden Arboretum-South	Geauga	640
83	Holden Arboretum-North	Geauga	n.a.
84	Big Creek	Geauga	560
85	Chagrin River	Lake	1,800
86	North Chagrin	Lake	170
87	Mulberry-Heath Road	Lake	1,270
88	Chaplin Forest	Lake	360
89	Penitentiary	Lake	540
90	Little Mountain	Lake	n.a.
91	Cascade Falls	Lake	n.a.
92	Grand River-West	Lake	212
93	Grand River-East	Lake	250
94	Kent State University	Lake	60
95	Lake Erie Beach-West	Lake	n.a.
96	Lake Erie Beach-East	Lake	n.a.
97	Geneva-on-the-Lake	Ashtabula	244
98	Armstrong	Ashtabula	8
99	Kingsville Township	Ashtabula	400
	PENNSYLVANIA		
100	Conneaut Creek	Erie	500
101	Albion	Erie	718
102	Gudgeonville	Erie	3,237
103	Raccoon Creek	Erie	324
104	Crooked Creek	Erie	465
105	Elk Creek	Erie	416
106	Mill Fair	Erie	727
107	Footemill	Erie	979
108	Four Mile Creek	Erie	778
109	Six Mile Creek	Erie	791
110	Sixteen Mile Creek	Erie	489
111	Orchard Beach	Erie	107
112	Dewey Road	Erie	115
113	Twenty Mile Creek	Erie	104

Table No. 7-1 (con.)

Map No.	Name or Location of Area	County	Acreage
	NEW YORK		
114	Zoar Valley	Erie	5,000
115	Larkin Woods	Erie	490
116	Sprague Brook	Erie	950
117	Boston Forest	Erie	n.a.
118	Sturgeon Point	Erie	120
119	Eighteen Mile Creek	Erie	730
120	Hunter's Creek	Erie	820
121	West Seneca	Erie	250
122	Darien Lakes	Genesee	1,230
123	Amherst-Clarence	Erie	n.a.
124	Tonawanda Creek	Erie	190
125	Reservoir	Niagara	134

* Denotes proposed wildlife area.

Table No. 7-2

PROPOSED EXPANSIONS FOR EXISTING RECREATIONAL AREAS

Map No. [1]	Area	Existing Acreage	Proposed Expansion	Potential Activities [2]
	ZONE 1			
	State Areas			
16	Waterloo Recreation Area	12,520 [3]	2,065	S,B,F,P,C,O
	Local Areas			
30	Lower Rouge Parkway	965	263	P,C,O
31	William P. Holliday	491	118	O
41	Kensington	4,222	140	O
6	Stony Creek	3,455	510	O
26	Willow	1,285	162	S,P,O
25	Oakwoods	1,426	199	C,O
	ZONE 2			
	State Areas			
39	Beaver Creek Wildlife Area	154	52	F,O
38	Independence Dam State Park	58 [4]	1,000	P,C,O
47	St. Marys State Park	2,036	300	P,C,O
29	Maumee State Forest	3,071	6,000	P,C,O
30	Harrison Lake State Park	196	200	P,O
	Local Areas			
	None			
	ZONE 3			
	Federal Areas			
F61	Perry's Victory National Monument	21	12	
	State Areas			
70	Killdeer Plains Wildlife Area	5,470	436	F,O
63	Miller Blue Hole	13	100	F,P,O
54	East Harbor State Park	1,260	30	P
58	Kelleys Island State Park	412	10	F,B,P,C,O
66	Rest Haven Wildlife Area	2,211	60	F,P,O
76	Punderson Lake State Park	505	300	P,C,O
81	Headlands State Park	125	1,400	O

Table No. 7-2 (con.)

Map No. 1/	Area	Existing Acreage	Proposed Expansion	Potential Activities 2/
	ZONE 3 (con.)			
	Local Areas			
83	Carlisle East Branch	176	643	S,F,P,C,O
82	Carlisle West Branch	572	1,437	F,P,C,O
84	North Black River	504	349	S,F,P,C,O
85	Sheffield French Creek	394	196	F,P,C,O
80	Vermilion River Valley	125	1,613	F,P,C,O
109	Hinckley	1,865	500	P,C,O
99	South Chagrin	547	200	F,P,O
92	Rocky River	4,933	300	P,O
95	Brecksville	2,479	200	P,O
97	Bedford	1,335	100	P
90	Bradley Woods	720	100	P
94	Brecksville-Royalton Parkway	262	50	P
102	North Chagrin	1,703	170	n.a.
125	Indian Point	30	140	B,F,P
126	Hell Hollow	367	660	P,C
129	Hogback Ridge	85	360	P,C
128	Hidden Valley	65	330	B,P,C
123	Wyman	49	160	F,O
131	Tuttle	n.a.	n.a.	S
112	Virginia Kendall	1,575	800	S,O
110	Furnace Run	825	200	P,C,O
159	Oppenhiem	75	95	n.a.
155	Como Lake	325	350	n.a.
152	Chestnut Ridge	1,200	200	C
157	Akron Falls	137	50	P
153	Emery	331	150	n.a.
158	Ellicott Creek	165	50	n.a.

1/ See map of existing areas.
2/ S=swimming, B=boating, F=fishing, P=picnicking, C=camping, O=other.
3/ Acreage outside of watershed included.
4/ Water acreage excluded.

4. Shoreline north of Milleville Beach - This is a two mile undeveloped stretch, which, like the two areas immediately above, would afford access to an otherwise intensively developed shoreline.

5. Kelleys Island - The State of Ohio presently owns acreage on the island, but it is felt that additional acreage should be provided wherever possible. Six hundred seventy acres with 1.1 miles of shoreline on North Bay were recommended for public acquisition.

6. Cedar Point - Already supporting a private amusement park, Cedar Point possesses some of the finest beaches on Lake Erie. Their quality would seem to justify public acquisition. Three hundred and twenty-five acres with 3.4 miles of shoreline were included in the recommended area.

7. Plum Brook - This is an area of shoreline with small dunes, some woodland and a lagoon in back of the barrier beach. Fourteen hundred acres with 2.3 miles of shoreline were recommended for public acquisition.

8. Cleveland Lakeshore - A lakeshore drive is suggested that would lie close to the foot of the bluff. Besides affording an excellent scenic view for pleasure driving, recreational areas, including beach, could be developed along the project.

9. Geneva-on-the-Lake - This area is primarily marsh and woodland with beach frontage. A lagoon exists which, with some dredging, would provide a desirable boat basin and launching site. The study area includes two hundred and forty-four acres with .9 miles of shoreline.

10. Elk Creek - Elk Creek is the largest Pennsylvania tributary leading into Lake Erie. The area consists of a beach and bluff area and a lagoon suitable for establishment of a natural area with compatible activities being picnicking, camping and swimming. Eight hundred fifty acres and 1.5 miles of shoreline were recommended for public acquisition.

The United States Army, Corps of Engineers, has presently under study a system of harbors of refuge at intervals of 10 to 15 miles along the entire Lake Erie coast. These harbors would provide needed boating opportunity for inland residents. Their construction, of course, is contingent upon receipt of Congressional approval and local cooperation. The location of proposed harbors is shown on Plate No. 6-5. Many of the existing harbors illustrated on this plate have been improved or are being considered for improvement by the Corps.

Many areas, not presently included in recreational plans, exist within the basin. The resource areas briefly discussed at the outset of the preceding chapter contain the more desirable sites. As recreational pressures increase, other recreational areas may be developed on lands presently considered to be of marginal recreation value. An example of such an area is Metropolitan Beach, north of Detroit, where a good sand beach was created by placing hydraulic fill in a former marsh. Undoubtedly, all land will experience more intense development and usage in the future, and more acute observation may reveal areas that would provide additional recreational opportunity. Some areas may become of recreational importance due to circumstances presently unforeseen. For example, areas presently held by the Department of Defense may be declared surplus properties and become available to state or local agencies for recreational development.

Proposals have been put forth by various agencies and private groups from time to time advocating the creation of islands in Lakes Erie and St. Clair using disposal material from urban renewal projects, dredging, and other sources. The Michigan Conservation Commission presently has under study a proposal to create a chain of islands in Lake St. Clair. While such proposals may have advantages for certain outdoor recreation activities, the disadvantages over the long term may be greater. It must be borne in mind for example that each island created would decrease the water surface area available to boaters and fishermen. In addition, certain types of material deposited in the waters of the lake may add to water quality problems. Therefore, each proposal should be thoroughly studied before material is deposited in the lake.

NEEDS AND GOALS FOR LANDS AND DEVELOPMENT

General

By the year 2000, our national population will double and the overall need for outdoor recreation facilities will triple.[92] Not only will there be more people, but they will have more free time, more money and be more mobile than ever before. Already the increase in demand for outdoor recreation developments is surging ahead of population growth. People prefer taking part in the relatively simple types of outdoor recreation--walking and driving for pleasure lead the list. Swimming, picnicking, fishing and boating are among the most popular. What people do now, however, is not necessarily what they may want to do in the future. The ORRRC report indicates more than 20 percent of those covered by their survey said that while they do not now participate in fishing, they would like to. Other activities for which there is a large unsatisfied desire include swimming, boating and "just going to the beach."

Water is a focal point for outdoor recreation activities. Most people seek water in which to swim or fish; on which to boat; to walk, picnic and camp beside; or just to look at. People also want their outdoor recreation facilities close to home. Two out of three Americans now live in metropolitan areas and by the year 2000, three out of four will reside in urban environments. It is here that the need for most types of outdoor recreation is concentrated.

Present Needs

The factors affecting the demand for outdoor recreation, as discussed in Chapter 5 of this report, are manifested in the attendance at recreation areas which are rising beyond the capability of the existing facilities to adequately support them. Overcrowding is a result with a concomitant deterioration of the recreational experience. See Plate No. 8-1.

The problem of adequately serving the recreational needs of the public comes into sharp focus if developed acreages are dealt with rather than the total public recreational areas.

Utilizing the methodology presented in detail in Appendix D, the figures outlined in Table No. 8-1 were developed to illustrate the magnitude of the need for developed public recreational acreage in the basin. A large deficit exists in terms of developed acreage in all three zones. In compiling data for this table, it was assumed that existing public recreation areas, except those which have been newly established, have been developed to the optimum level.

The acreages presented are those calculated to support anticipated visitations on capacity days. These acreages are considered necessary

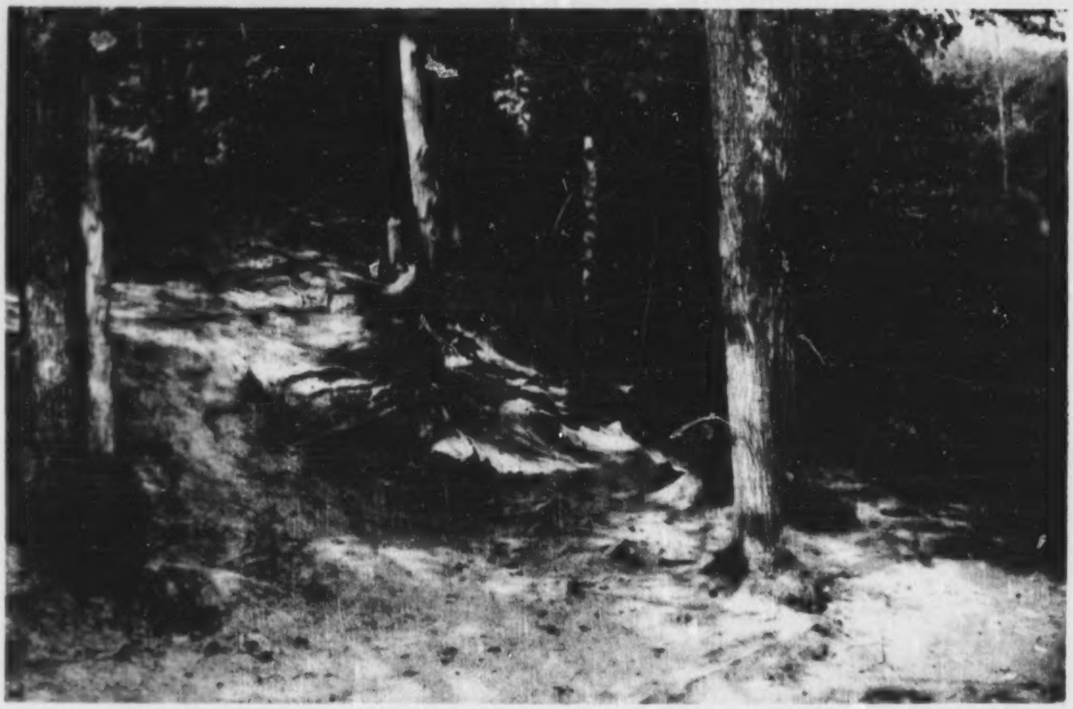


Plate No. 8-1 The effects of over use are vividly portrayed in this photograph of the lakeshore in Punderson State Park, Ohio. BOR photo.

to support the maximum number of people who are expected to use recreational facilities at any one time on a normal summer Sunday. The acreages are based on categories of recreational areas suggested by Marion Clawson, et al., in their publication entitled, Land for the Future. They are as follows: User-oriented areas, represented by city, county, and other local-type parks, are usually located near the user irrespective of the quality of resources avilable. User-oriented areas may be compared to Class I--High Density Recreation Areas as defined by ORRRC in Outdoor Recreation for America . Intermediate areas, represented by state and regional type parks, utilize the best available resources within a reasonable distance of the user. They may be compared to Class II--General Outdoor Recreation Areas as defined by ORRRC. To some extent, intermediate areas may also include the more highly developed Class III areas. Resource-oriented areas, represented by National Parks and Forests, are located in areas of outstanding resources. Since this category is based on location of resources and not necessarily on people's needs, it is not included in this presentation. There are, however, areas such as Niagara Falls and the Western Island area of Lake Erie which could conceivably fall into this category were it not for certain factors such as intensive private development.

The acreage presented as "Deficit" indicates the additional acreage needed in each zone if divided equally between user-oriented and intermediate types of areas. This approach was necessary because the classification of existing areas into the two types is not clear-cut. An intermediate area may be user-oriented for a certain portion of the population, and both types of areas can support essentially the same activities.

In addition to the developed acreage which is necessary to support the basic day-use activities, other lands must be provided to make provision for the more extensive recreational uses such as hiking, sightseeing and nature walks and to provide a desirable buffer area. Additional lands have been considered in this study as they relate to the present deficit of developed acreage. The total deficit, which is the total acreage needed in addition to existing acreage to satisfy present recreation demands, is approximately 172,000 acres.

Depending upon considerations such as the ability to provide for these area types, existing pressures on each of the types, etc., the figures would then be subject to modification. That is, if indications were that user-oriented areas were needed more than intermediate areas, the figures could be lowered somewhat, and if intermediate areas needed more attention, the figures could be raised.

Future Needs

Table No. 8-2 presents future acreage needs for the basin. While concerned agencies are taking immediate steps to alleviate the present problems, it appears there will remain a considerable shortage of available public recreation land. As indicated in Table No. 8-2, a surplus

Table No. 8-1

PRESENT PUBLIC ACREAGE NEEDS: LAKE ERIE BASIN [1/]

Developed Acreage

Column 1	Column 2	Column 3	Column 4	Column 5
Zone No.	Needed	Existing [2/]	Deficit (Col. 2 - Col. 3)	Total Additional Acreage Needed (4 x Col. 4)
Zone 1	35,700	22,000	13,700	54,800
Zone 2	4,300	1,200	3,100	12,400
Zone 3	45,100	19,000	26,100	104,400
Basin	85,100	42,200	42,900	171,600

[1/] Presented to nearest 100 acres. See methodology Appendix D.

[2/] Existing development figures were obtained from Bureau of Outdoor Recreation 8-73 forms of the recent Nationwide planning effort.

Table No. 8-2

PUBLIC ACREAGE NEEDS BY 2020: LAKE ERIE BASIN [1/]

Basin No.	Needed Acreage [2/]	Present Existing Acreage	Presently Proposed Acreage	Acreage Deficit [2/]
Zone 1	328,200	107,500	37,100	183,600
Zone 2	39,100	26,000	31,400	(18,300 surplus)
Zone 3	715,300	103,900	64,600	546,800
Basin	1,082,600	237,400	133,100	712,100

[1/] As development levels of the proposed areas are unknown, acreages are presented only in terms of total acreages. See methodology in Appendix D.

[2/] Based on increased development levels from those accepted at present.

will exist in Zone 2. Since recreational activities cannot logically be expected to adhere to such artificial boundaries, this surplus will serve to reduce the deficit and relieve the pressures in adjacent areas. It must be kept in mind that these acreage estimates are based on the assumption that the recreational demands exerted upon the basin will be totally satisfied within the basin. While the demand methodology used makes certain allowances for persons seeking recreation outside the basin, the situation with regard to the year 2020 may change. Perhaps greater numbers will travel outside the basin reducing the demand on the basin's recreation resources. If its potential is fully realized, the private sector could help alleviate the public demand for future acreage needs. Flexibility will be needed as future trends become more clear.

Goals

Virtually all parts of the Lake Erie Basin lie within forty miles of an SMSA. This, combined with an excellent transportation network, places tremendous recreational pressures over the entire basin. For this reason, existing recreational areas should be developed to the maximum extent possible while remaining consistent with recognized standards. Areas should be provided for those activities which receive the most participation. This would require emphasis on development of day-use facilities. This must be the goal because an attempt to provide for the most desired activities will more nearly satisfy the basic recreational desires of the public than will an attempt to provide the full range of activities, many of which receive participation by only a limited group. Such activities may be satisfactorily provided by the private sector or by areas outside the basin. In the future, development plans for existing and proposed areas should consider basic activities such as swimming prior to non-basic activities such as water skiing.

Every effort should be made to set aside unique areas for recreational use. Whenever possible, development should include facilities for those activities that are compatible with the primary purpose for the area. Numerous wildlife areas in the basin have very little development at present. This development provides an opportunity for such compatible pursuits as fishing and wildlife observation. Additional opportunity could be provided for activites of a passive nature such as picnicking and still be consistent with agency objectives.

Recreation resource agencies should make every attempt to locate facilities adjacent to desirable water resources. Demand for those activities which require water surface are among the most popular and are also among those experiencing the fastest growth. Swimming appears to be an outstanding activity which should be provided at every opportunity. The ORRRC Study shows that swimming is significantly associated with all other outdoor activities; this suggests that swimming facilities would enhance any recreational area. Of the total Federal and state recreation areas in the basin, the average attendance at an area that provides swimming is over six times that of an area not providing swimming. In the ORRRC Survey, park visitors were interviewed as to the satisfaction of their experience. Though the majority of those interviewed expressed satisfaction with their visit, one-fifth expressed some disappointment. The complaints were centered around the unavilability of facilities for water sports.

Considering that all parts of the basin are within an easy driving distance of the various population centers, facility increase or establishment in any part of it would help to alleviate recreational pressures. However, care must be taken to plan for lands and facilities where they will do the most good. In this light, it should be apparent that lands and facilities should be provided as close as possible to the population they are intended to serve.

Location is an extremely important factor in the consideration of attributes for recreational areas. People tend to seek the nearest area that offers the desired facilities. This pattern may be altered somewhat if an area farther away is more easily reached or offers some outstanding feature. In an ORRRC Study, "time" was given as the most limiting factor for participation in most activities. In the same survey, 14 percent of the people interviewed said that facility inadequacy was the restricting factor, with three-fourths of the complaints related to distance. This indicates that if facilities could be quickly and easily reached, there would be an increase in demand satisfaction.

As travel time to a recreation area is often a substantial part of the total recreational outing, efforts should be exerted toward making this segment of the experience pleasurable. Beautification should extend well into the urban area in the form of parkways and promenades bringing a recreational environment closer to home.

The above discussion provides some insight into the problem of overuse. The nearer, more easily accessible areas which provide the most desired activities often experience extremely heavy use. Plate No. 8-1 shows the extent of site deterioration from over-use. Based on acceptable numbers of annual visits per acre for the intermediate area suggested by Clawson,[11/] extensive over-use occurs throughout Zones 1 and 3 while only slight over-use occurs in Zone 2. Less over-use occurs in Zone 2 from a lack of swimming and boating opportunities at recreation areas. The larger reservoirs are used for public water supply purposes and are presently unavailable for intensive recreational use. Lake St. Marys, Indian Lake and Lake Loramie experience heavy recreational use for swimming and boating activities. The latter two areas lie just outside the basin. Also, the large numbers of natural lakes lying just outside Zone 2 in Steuben, La Grange and Noble counties draw Ft. Wayne residents outside the basin. This situation may be intensified in the near future as three large reservoirs are under construction southwest of Ft. Wayne in the Wabash Basin.

The widespread overuse situation in the basin cannot be expected to diminish in the foreseeable future. Proposals made by concerned agencies will help to alleviate the problem, but pressures continue to mount rapidly which do not diminish the gap between demand and demand satisfaction. As the available facilities become crowded, more difficult to get to (as a result of traffic congestion) and water and land deterioration becomes more pronounced, activities such as reading, television, movies and hobbies may experience an increase as a substitution. The interests of new generations being raised in metropolitan areas under the above conditions may be different from interests of preceeding generations.

Whether increased leisure time increments occur during the weekday or the weekend will be reflected in increased pressures on user-oriented areas in the first instance and intermediate areas in the second.

Management practices need careful scrutiny. Future demand satisfaction and popularity of an area are influenced by management. It is on this point that much of the future importance of the private sector will be determined. Successful recreational area administration and management depends on skill and training. In management, as well as in planning, more intelligent decisions can be made if surveys are undertaken to determine the preferences of the effective population. Two outstanding examples of such surveys are those accomplished by the Huron-Clinton Metropolitan Authority and the Cleveland Metropolitan Park District. Home surveys should supplement on-site surveys to obtain less biased results regarding certain questions such as area type and activity preferences.

In order that optimum use may be more nearly achieved, changes in tastes, interests and social institutions must be anticipated and considered in planning programs. Yet these programs must remain flexible to allow for necessary adjustments.

The rapidly expanding development throughout the basin requires that lands and waters presently available for recreation or those under consideration will be adequately protected for future recreational use. Protection is necessary not only from competition for land but also from noncompatible uses which diminish the satisfactions to be gained from the recreational outing. If properly administered, zoning when used in conjunction with related controls presents the most appropriate means by which governmental units can control land use. Zoning is an important tool which can be used to preserve areas for recreational use and at the same time prevent uses of an area which would be inconsistent with sound land use practices.

Cluster development should be adopted wherever feasible along water frontage. The private residential and cottage development along the Lake Erie shore prohibits public access to the lake in many areas. Wherever future water impoundments are being planned, cluster developments should be considered along with zoning and deed restrictions to ensure proper development.

Each governmental unit concerned with the provision of outdoor recreational opportunity in the basin employs methods for accomplishing the above-mentioned items. Many of these are related to financial capability. Bonding programs and earmarked taxes are being used successfully in a number of states. Legislatures have innumerable alternatives before them for the division of every tax dollar. Legitimate questions can be raised concerning the length of which they should go in order to provide for "free" recreational opportunity. In this light, it is probable that user fees and charges will become more widespread.

As indicated in the foregoing discussion, the long term recreational needs of the Lake Erie Basin are tremendous. Each of the several state and metropolitan agencies and many of the county and municipal agencies within the basin have developed plans designed to meet a segment of these needs. Such efforts point the way toward the goals which must be achieved if needs to the year 2020 are to be met. Much study and planning remains to be done. It can be accomplished through presently constituted public agencies; however, public support of the agency programs aimed at fulfilling the recreational needs is also necessary. Such programs include not only the more obvious acquisition and development of recreation areas, but also programs for developing better roads and other transportation systems, improvement of fish and wildlife habitat and aiding private recreational enterprise. Citizen support of health and sanitation agency programs developed to advance efforts to provide clean water for recreational purposes is another vital adjunct to meeting present and future outdoor recreation needs in the Lake Erie Basin.

Federal Assistance

Federal assistance has been made available to state and local agencies for planning, acquisition, and development of areas for recreational purposes by several means.

The Housing and Urban Development Act of 1965 has amended the Housing Act of 1961. Grants for acquisition and for recreational development of lands have been authorized if in accord with a comprehensive plan and if purchased initially with Housing and Home Finance Agency assistance. The cost-share percentage has been increased to 50 percent.

The Land and Water Conservation Fund Act of 1965, Public Law 88-578, similarly enables state and local agencies to plan for, acquire and develop recreational areas. Grants are available up to 50 percent of the total project costs. Acquisition and development projects must be in accord with the objectives of the statewide comprehensive plans which have been prepared by all states in the basin.

The Federal Water Projects Recreation Act of 1965, Public Law 89-72, establishes procedures whereby lands and facilities for recreational purposes can be included as a purpose in Federal water development projects. Non-Federal public bodies must share the cost of providing recreation lands and facilities and agree to operate and maintain them under certain circumstances. Examples of possible projects that could fall in this category are the proposed Mill Creek Reservoir in Michigan, the proposed Bucyrus Reservoir in Ohio and the proposed Lake Erie and Ohio River Canal project in Ohio.

The Watershed Protection and Flood Prevention Act of 1954, Public Law 566 as amended by the Food and Agriculture Act of 1962, permits the U. S. Department of Agriculture to share up to one-half the costs for land, easements or rights-of-way on project areas to be managed for recreational purposes. Cost sharing for development is also available. Several of these watershed projects are in the planning stage in the Lake Erie Basin.

The Food and Agriculture Act of 1965, Public Law 89-321, provides under Title VI, for the retirement of 40 million acres of cropland between 1965 and 1969. Potential for recreational use of these lands is included in a permanent retirement phase of the Act which provides for the acquisition of these lands by local governmental units on a cost-share basis. Easements can also be secured for the provision of public access for periods of five or ten years.

WATER QUALITY INFLUENCES

General Situation

The Lake Erie Basin is one of the most highly industrialized regions of the country. During the years of industrialization and urbanization, little thought was given to the effect of dumping wastes into the lake and its tributary streams. As a result, the recreational resources of the basin have been degraded through man's misuse.

According to Report No. 24 of the Senate Select Committee on National Water Resources, recreational uses of water require that it be of high quality, paralleling that for public water supply. The limitations placed on recreation by water quality will vary depending on the type of water-oriented activity to be engaged in.

Recently the water quality of Lake Erie has received wide public attention through the news media. The water quality of the lake has been under study for several decades principally from the standpoint of its effect on fish life. More recently its effect on recreational activities particularily swimming has been studied.

Water Quality Influences on Swimming

As indicated in Chapter 3 of the report, Lake Erie is the most desirable of the Great Lakes for swimming for the reasons therein stated. It is the most desirable, that is, except for one primary factor--the state of the water quality. See Plate No. 9-1. In certain portion of the basin, the deterioration of water quality around swimming beaches was noted quite some time ago. As far back as 1931, an article published in the Cleveland Plain Dealer on May 29 quoted Dr. E. B. Buchanan of the City Health Department as indicating the B. Coli bacteria counts at all the city's beaches were well above acceptable standards. A Cleveland Press article of July 1933, warned people of the danger to their health which might result from swimming at White City Beach, Cleveland. In August of 1941, the city beaches were closed during a polio epidemic.

Poor water quality at Lake Erie beaches is not limited to the Cleveland area. The Ohio Department of Natural Resources conducted a pollution survey of Lake Erie which was published in 1953. The study included conditions on beaches along Ohio's Lake Erie shore. The water quality of 28 beaches was sampled and the beaches were rated "acceptable," "doubtful," or "unacceptable." Eleven of the 28 were rated "unacceptable;" six were rated "doubtful." A 1962 lakefront study of the Cleveland metropolitan area by the Cleveland Regional Planning Commission included information on coliform counts at five area beaches. The figures indicate the beaches are still grossly polluted. In 1964, the Public Health Service collected microbiological water quality data on beaches at Cleveland and Euclid, Ohio and at Erie, Pennsylvania. This study indicated all but one of the

Plate No. 9-1 The quality of the water in the vicinity of certain beaches along the shore of Lake Erie has been adversely affected by sewer outfalls in close proximity to them. Photo courtesy Evening Observer, Dunkirk, New York.

Ohio beaches were grossly polluted. The Monroe, Michigan County Health Department and the Michigan Water Resources Commission, through studies made in cooperation with the Michigan Department of Conservation, found the beach at Sterling State Park intermittently grossly polluted. As a result of these and other studies, several of the beaches on the Lake Erie shore have been closed or posted as unsafe for swimming.

Various studies on the pollution of beaches indicate that pollution is greatest after a period of precipitation. This apparently occurs when the capacity of the combined sewer facility for storm run-off and for sewage is exceeded. The excess is discharged without treatment. This waste will normally persist three to five days following a period of run-off. In addition, the direction of wind can cause variations in the intensity of pollution. At some beaches, the factors of precipitation and wind have been correlated with coliform count and the beaches are closed intermittently. Such programs are in effect at Presque Isle State Park in Pennsylvania, at Dunkirk, Hamburg Town Park, Millers and Times beaches in New York and at Crane Creek State Beach in Ohio.

Although poor water quality has been present over the years, many beaches remain well attended and some are even over crowded on hot summer holidays. The "Lakefront Study" conducted by the Cleveland Regional Planning Commission indicated the six lakefront beaches of Cuyahoga County had a 1959 attendance of 942,000. The 1964 attendance at Sterling State Park was in excess of 300,000; many went swimming despite the warnings signs on the beach. See Plate No. 9-3. With the exception of Zone 1, the Lake Erie Basin is largely devoid of natural lakes. Thus, people look to the lake as one of the few places available for swimming.

Over the years, swimming areas around the lake have had to be abandoned for such reasons as pollution, competing industrial uses and erosion. Many have been gone so long that local residents have little or no recollection of them while others, such as Sterling State Park beach, were closed only recently. An account of a trip by steamship in 1884, from Cleveland to Mackinac Island by C. D. Whitcomb tells of the excellent beaches, mineral baths and resorts along the shore between Detroit and Port Huron. While a few of the beaches recounted by Mr. Whitcomb remain, their quality does not compare with that described by him. 137/

Known poor water quality has had no apparent effect on the use of certain areas for recreational pursuits by some people; however, there is ample evidence that such knowledge does affect the recreational habits of others. This is well illustrated by events at Sterling State Park. The 1959 attendance at Sterling was 1,239,000, the majority of whom were swimmers. On Tuesday evening, August 15, 1961, the beach was posted with signs lettered, "UNSAFE FOR SWIMMING, Michigan Department of Health." The attendance report of the week ending August 20, 1961, illustrates dramatically the public reaction to the posting and related news reports appearing in local papers. See Table No. 9-1.

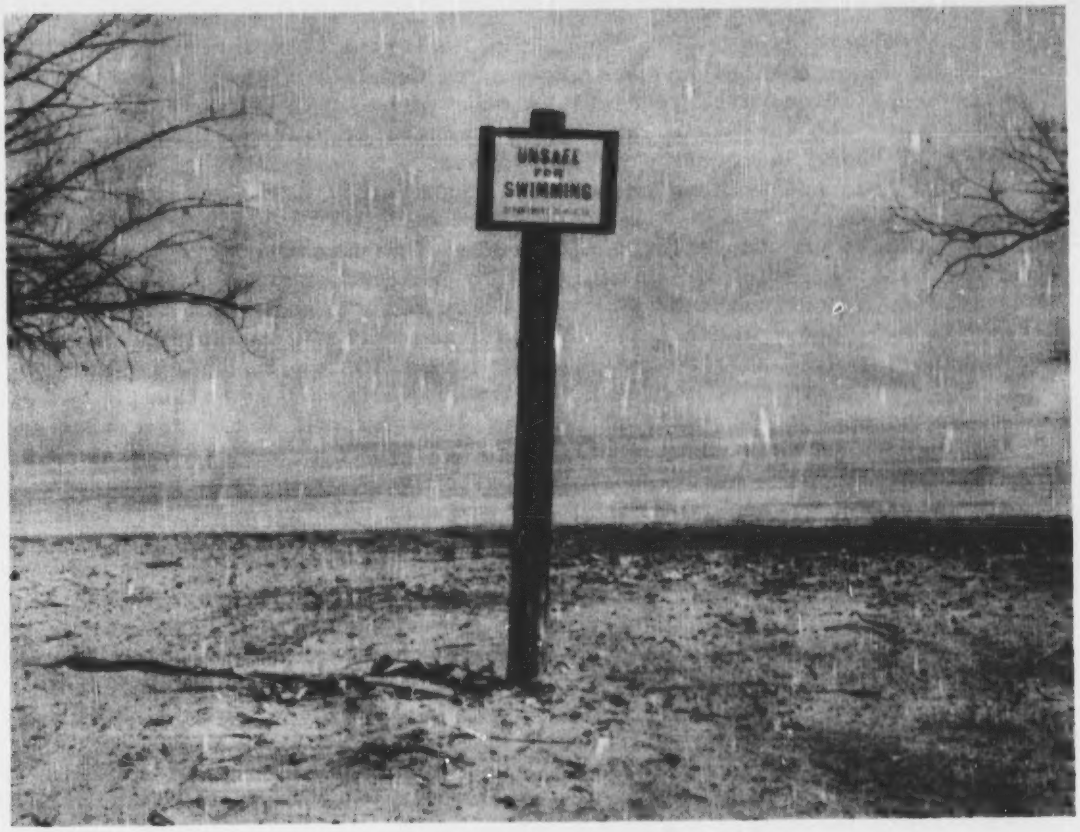

UNSAFE
FOR
SWIMMING

Plate No. 9-2 Despite posting of the beach at Sterling State Park on Lake Erie in Monroe County, Michigan, since August 1961, people continue to swim there. BOR photo.

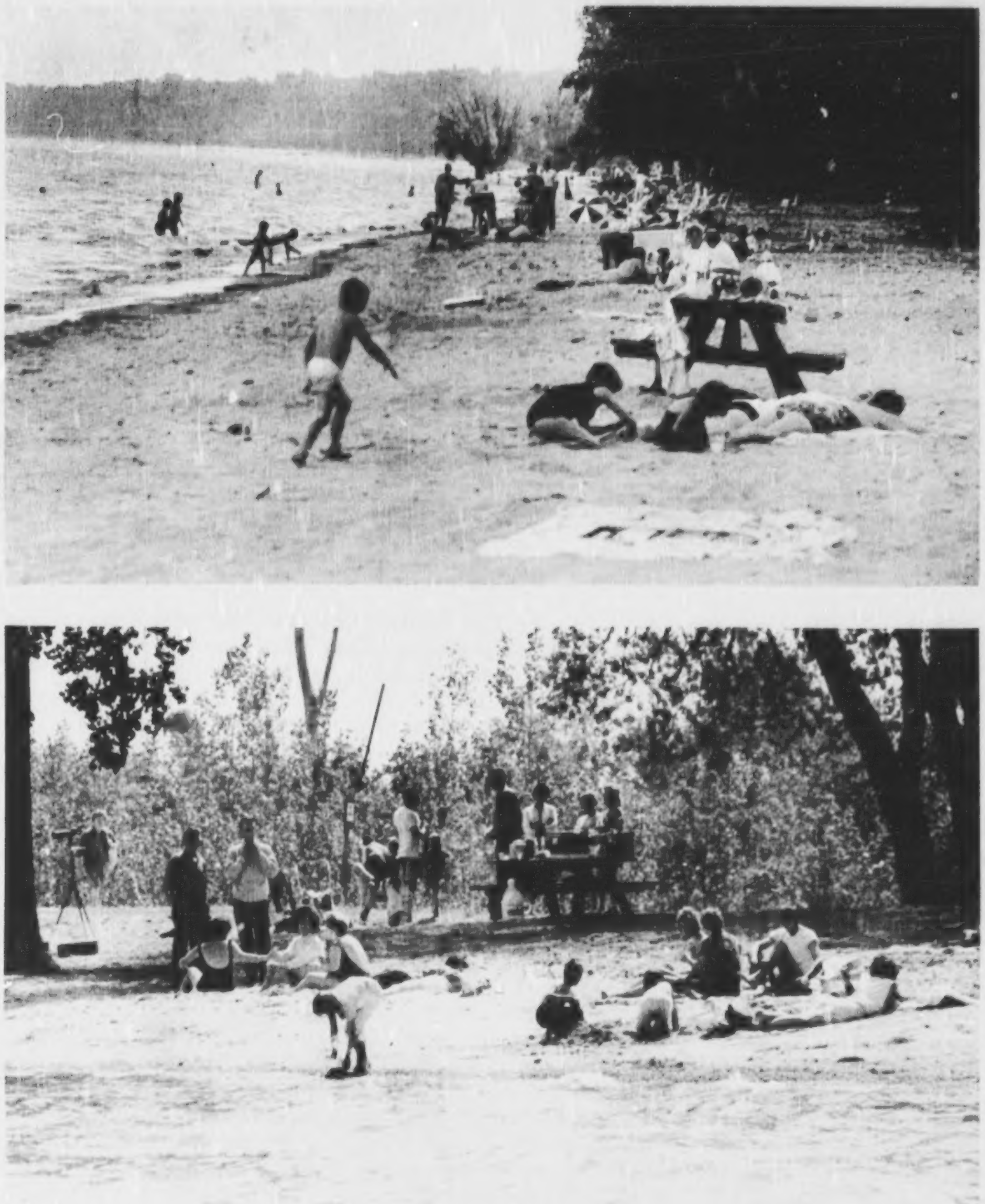


Plate No. 9-3 The beach at Sterling State Park, Michigan, is clearly marked as unsafe, as indicated by the sign similar to that shown on Plate No. 9-2 (see arrow). People continue to use the beach for swimming and other recreational purposes. Photos courtesy Monroe County News, Monroe, Michigan.

Table No. 9-1

COMPARISON OF ATTENDANCE RECORDS AT STERLING STATE PARK
(Beach Posted as Unsafe August 15, 1961)

Year	Annual Attendance	Date (3rd week in August)	Weekly attendance	Date August 1961	Daily attendance
1959	1,239,000			14 Monday	5,160
1960	911,246	1960	40,921	15 Tuesday	6,660
1961	651,726	1961	32,904	16 Wednesday	7,476
1962	255,139	1965	2,933	17 Thursday	4,236
1963	302,799			18 Friday	1,860
1964	319,500			19 Saturday	4,068
				20 Sunday	3,444

The beach front recreation facilities of the basin are well attended; however, the use is not what it would be were the water quality more acceptable.

Many of the streams and rivers of the basin flow into impoundments or through natural lakes around which swimming facilities have been developed. From the standpoint of swimming, water quality is very important in impounded areas. Since pollutants introduced upstream may quickly change the water quality of such a swimming area, they should be constantly monitored. On any river downstream from a sewage discharge, whether it is treated or not, swimming should be prohibited because accidental spills or untreated sewage could move into the area and not be detected soon enough to warn swimmers.

The history of the Ann Arbor Municipal beach is illustrative of the history of beaches established in impoundments in the basin. The beach had its beginning in 1915 on an impoundment behind a dam constructed by the Edison Electric Company on the Huron River. Apparently no one questioned the advisability of swimming at the beach until 1937 when a proposal was put forth to construct a new bathhouse. Water samples were collected during the next three years and according to the April 5, 1940, issue of the Ann Arbor News, the samples indicated 30.5% of the time the coliform count was 1,000 per 100 milliliter (ml) or more. (1,000 per 100 ml is considered the maximum allowable for safe swimming from the standpoint of health.) It was not until 1944 that the Huron River was ruled unsafe for swimming according to an Ann Arbor News article published in June of that year. An article appearing in the July 7, 1945, issue of that paper refuted the earlier article and indicated the beach at least was safe. The controversy continued, and an article of June 23, 1948, said,

> Beaches on the Huron River below Ypsilanti were on a list of "condemned" swimming places according to the State Streams Control Commission. Municipal Beach is satisfactory, however, Lansing authorities indicated.

The final reference to the Ann Arbor Municipal Beach was written July 18, 1951. The article indicated the beach did not open that summer due to pollution. The bathhouse is gone along with all other evidence of the existence of a municipal beach in Ann Arbor. See Plate No. 9-4. According to the news articles, the beach was in operation about 30 summers and had an annual attendance of 35-40,000. The Huron River formerly provided many other swimming areas. A June 1939, issue of the Ann Arbor News listed the following: sandbar near the Whitmore Lake Road Bridge; Osborn's off Huron River Drive; Scio, between Delhi and Dexter; Hudson Mills and Rawsonville Dam. None of these areas are presently used for swimming.

The foregoing examples illustrate past influences of water quality on the recreation activity of swimming in the basin. Some insight into the possible magitude of these effects over a period of time can be gained by considering probable visitations at a park in the basin with and without improved water quality*. As has been illustrated, the effect of posting the beach at Sterling State Park was very dramactic. Table No. 9-2 illustrates projected attendance losses at Sterling State Park attributed to water quality. Improved facilities necessary to meet future demands were taken into consideration when these projections were established.

Table No. 9-2

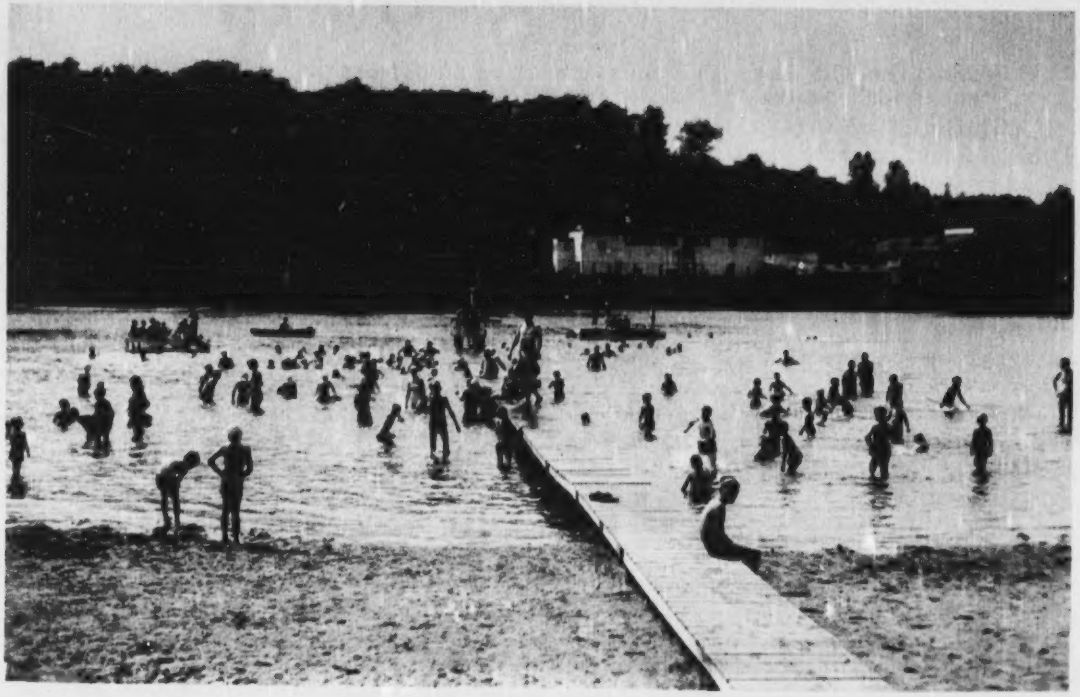
PROJECTED ATTENDANCE LOSSES AT STERLING STATE PARK, MICHIGAN WITHOUT IMPROVED WATER QUALITY (thousands)

Year	1965	1970	1975	1980	1985	1990	1995	2000
Attendance with improvement	1,450	1,525	1,580	1,630	1,675	1,800	1,825	1,850
Attendance without improvement	350	425	470	490	500	500	500	500
Loss	1,100	1,100	1,100	1,140	1,175	1,300	1,325	1,350

Accumulative loss 1965-2000 (includes intervening years) 42,850.

---

* See definition page 1-4.



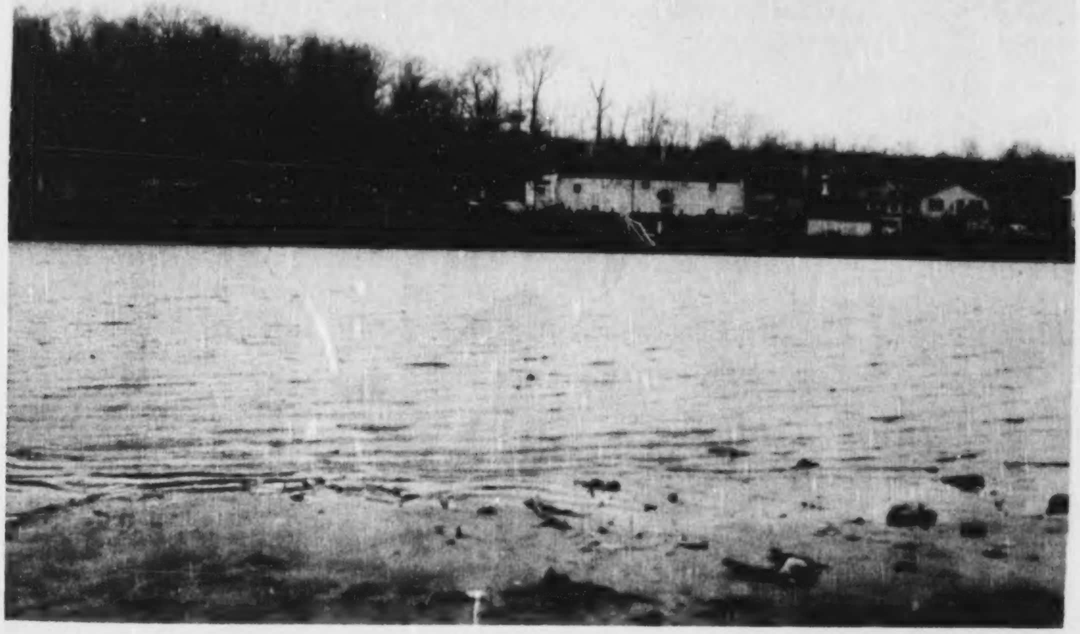


Plate No. 9-4 The Ann Arbor municipal beach was a popular swimming facility on the Huron River for about 30 years. It is no longer in use due to water pollution. Upper photo courtesy Ann Arbor News, Ann Arbor, Michigan. Lower photo by BOR.

As illustrated, the total accumulative loss in recreation days over the 35 year period, 1965-2000, may approach 50,000,000. Assuming 60 percent of the people who did not attend would have gone swimming had they attended under improved water quality conditions, the benefit attributable to improvement would be 30,000,000 swimming activity days for the period at this one park.

Based on the specific examples related in the preceding narrative, the immediate benefit of improved water quality on swimming as an activity was estimated. This estimate is based on 1963 attendance, facilities, and conditions. The results are illustrated on Table No. 9-3.

Table No. 9-3

ESTIMATED INFLUENCE OF WATER QUALITY ON SWIMMING ACTIVITY AT PUBLIC BEACHES LAKE ERIE BASIN

Estimated swimming activity at public beaches (1963)	16,455,000
Estimated swimming activity at public beaches which frequently exhibit poor water quality and should be closed (1963)	780,000
Estimated swimming activities without water quality improvement	15,675,000
Increase in swimming activity with improved water quality	
Reopening of closed beaches	1,325,000
Increased participation by present patrons	2,640,000
Increased attendance participation	2,625,000
Total increase	6,590,000
Estimated swimming activity with improved water quality	23,045,000
Annual loss without improved conditions & with enforcement	7,370,000

If the water quality of the lake and its tributaries were improved, public agencies would be more prone to consider additional beach development. As an example, the city of Toledo with more than 300,000 people is adjacent to the shores of Lake Erie and has no public swimming facilities along the shore. There is little inclination to provide swimming facilities under present water quality conditions. Under suitable water quality conditions, public pressure could very well cause such facilities to be provided. The Cleveland Regional Planning Commission estimates the four county area of Cuyahoga, Lorain, Lake and Geauga will need 81 additional acres of beach by 1970. Emphasis could be placed on acquisition along the Lake Erie shore if water quality were improved to permit swimming in areas acquired.

A comparison of the relative cost of providing a unit of swimming activity at a natural beach area as opposed to providing a unit of swimming at a pool was made. It costs on the average eighty dollars more per unit of daily swimming activity capacity at a pool than at a natural beach. In addition, there are aesthetic and psychological advantages to good natural beach areas in comparison to swimming pools. "A day at the beach" often includes such amenities as sun bathing, playing in the sand, and exploring the beach.

Water Quality Influences on Boating and Associated Activities

Boating as a recreational activity within the basin may be divided into several categories which involve other water-oriented recreational activities. Such a division includes: water skiing, scuba diving, fishing and hunting from a boat, canoeing, sailing and cruising for pleasure. Water quality influences as they relate to boating vary depending upon the activity. Water quality in some instances affects the boat as well as the boater. See Plate No. 9-5.

Water skiing is a very popular sport on Lakes Erie and St. Clair as well as on many of the inland lakes of the basin. Water skiers are likely to be found on any body of water large enough to permit maneuvering of the boat and the skier. Since water skiing involves body contact, water quality requirements should be the same as that preferred for bathing. Unlike swimming, water skiing can be carried out at some distance from shore. This enables the skier to get away from the heaviest concentrations of pollution associated material which is usually closer to the shore. An exception to this general statement is found in the lower Detroit River and southward as far as Point Mouillee on Lake Erie when the area is affected by "storm water overflow." The growth of algae and other aquatic plants in lakes of the basin poses a particular hazard to the water skier. See Plate No. 9-5.

Most standards relating to water quality requirements for recreational activities indicate pleasure boating does not require the same high quality as swimming. However, to be suitable for boating, the quality of the water should be pleasing to see and offer no offensive odors. This is too often not the situation in such areas heavily used by recreational boaters. The smell of raw sewage permeates the air near the mouth of the Clinton River and on the lower Detroit River. Debris piled along the banks of the lower Huron River is aesthetically unpleasing. The condition of the low Cuyahoga River has recently received adverse publicity and leaves much to be desired from the standpoint of the recreational boater.

In addition to the effects of water quality on the boating equipment as illustrated in Plate No. 9-5, masses of floating greasy material reportedly dumped from large ships have been observed at many points around the lake. This material smears the sides of boats and clings to the feet of the less wary as they launch or beach their boat. See Plate No. 9-6.

The operators of pleasure craft have been accused of polluting the waters of the basin. This type of pollution has been evidenced at marinas and harbors all along the Lake Erie shoreline. Pollution of inland lakes from recreational craft was recognized by an article which appeared in the May 26, 1964, issue of Ann Arbor News. This article indicated the concern of the Washtenaw County, Michigan, Health Department for pollution caused by the extensive use of pontoon cruisers, which do not have sanitary facilities on inland lakes. The amount of contaminant contributed by pleasure craft is not significant when considering pollution in

Above - Aquatic plants pose serious problems to the recreational use of waters in the Basin. They may cause hazards to swimmers and boaters in addition to being aesthetically displeasing. Photo courtesy Cleveland Plain Dealer, Cleveland, Ohio.

Chemical corrosion of boat motors is evidenced in this photo taken near Buffalo, New York, on the Niagara River. BOR photo.

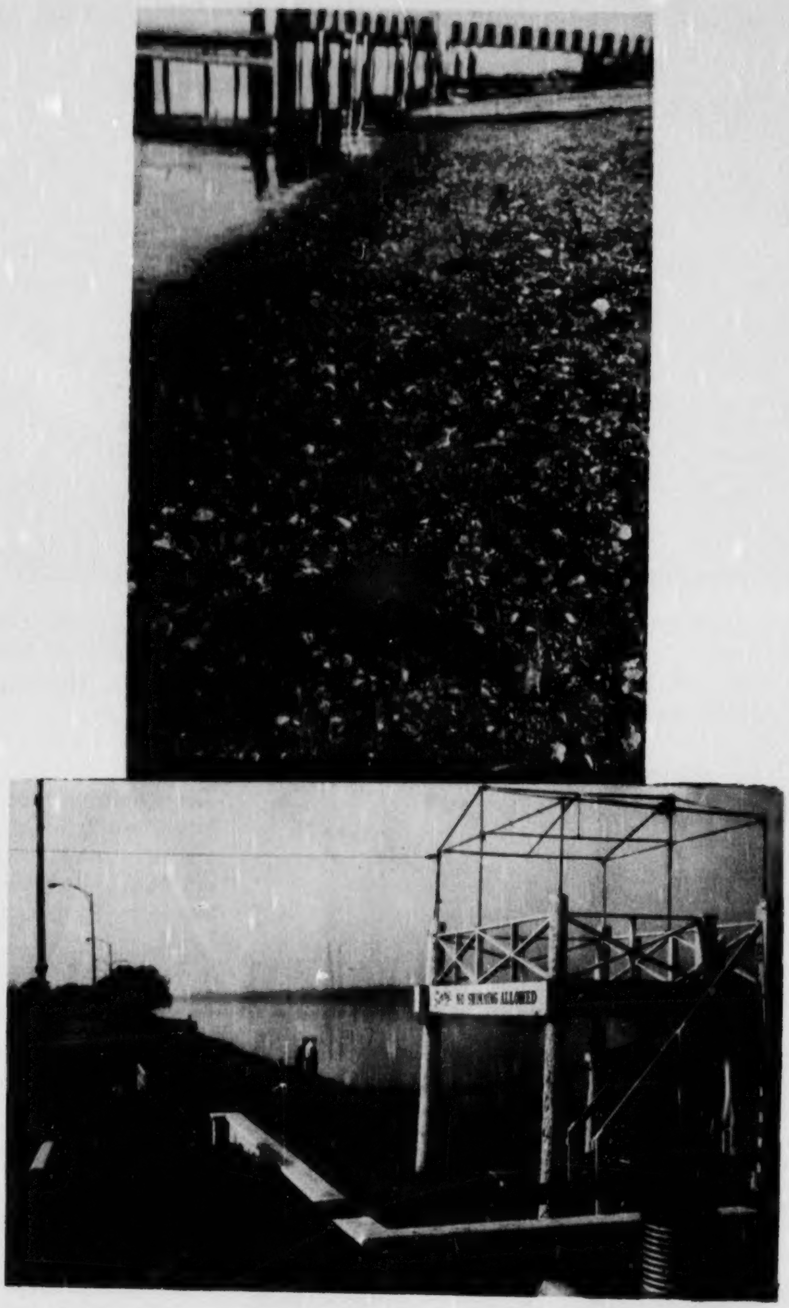


Plate No. 9-6 Globs of thick greasy material such as this pictured near Buffalo, New York, were found at many locations along the shore of Lake Erie. Such material was an obvious hazard to the unwary recreationist. BOR photos.

the basin as a whole, but in local situations it is important. Every source of pollution must be controlled if recreational waters are to be safe for all water-oriented outdoor recreational activities. See Plate No. 9-7.

Water Quality Influences on Fishing

The influence of water quality on fishing is expressed in two general ways: (1) possible changes in species composition and (2) the aesthetic quality of the fishing experience. Over the years, yellow perch have been dominant in the sport fishing catch and there is no particular evidence of change. See Plate No. 6-8. However, some of the more desirable game fish; blue pike, sauger and northern pike for instance, may be decreasing in the sport catch and consequently fishing may be less attractive to some fishermen. The influence of aesthetics on fishing is much more subtle and hard to define. Odors, shorelines littered with unsightly materials and the general knowledge that pollution is present certainly has an effect on fishing activity within the basin. The total influence may be best summed up by the statement of the Cleveland Regional Planning Commission in its Lakefront Study: "Because of pollution . . . Cleveland's annual fishing Derby Day had to be discontinued."

Other Adverse Effects of Poor Water Quality

When nutrients from sewage and other sources are added to water, eutrophication occurs. This increases the growth of algae and aquatic plants. Growth of floating or emergent aquatic plants may encroach upon recreational areas. As the growing season advances, the plants may be detached and washed ashore. The decaying masses, often mixed with dead fish and other litter, are aesthetically displeasing and give off an obnoxious odor. Boating, water skiing, fishing and swimming are influenced to a degree by these adverse conditions.

This condition exists in many tributary waters as well as parts of Lake Erie. In eastern Lake Erie along the Pennsylvania and New York shore, the odor and unsightliness of aquatic plant and algae remains on the shoreline have caused financial loss to hotel and resort owners.

Cottage and homeowners located on the shores of Lakes St. Clair and Erie also suffer from the effects of pollution. In addition to the effects already mentioned, cottage owners along the shore have had to endure; (1) littering of their beaches with every imaginable floatable item, (2) contamination of their domestic water supply, (3) foul odors for extended periods of time and (4) in some case, lowered property values. The problem has become serious enough in the western portion of Lake Erie, particularily where the effects of pollution from the Detroit Metropolitan area are felt, that a very active citizens organization has developed to encourage the initiation of action to "clean up Lake Erie."

While cottage owners along the shores of the basin have in many areas been adversely affected by pollution, they have also been responsible for it.

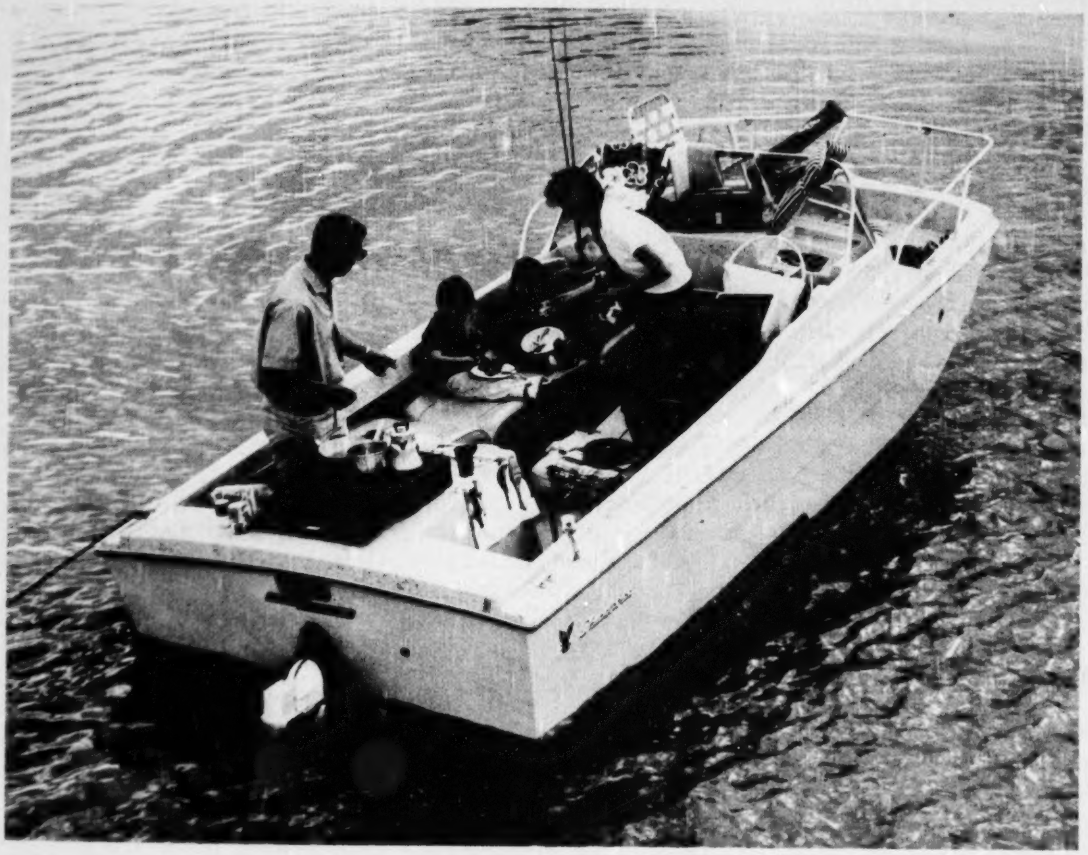


Plate No. 9-7 A family on a day's outing around Lake Erie's Western Islands. Will they throw their refuse overboard or stow it for later deposit on shore? Photo courtesy Cleveland Plain Dealer, Cleveland, Ohio.

Many lakeshore communities are unsewered, i.e., they have no central waste treatment plant but must rely upon individual septic tanks for waste disposal. Poorly designed and overburdened systems in such areas leak effluent into adjacent lake water.

The aesthetic effect of poor water quality of the Lake Erie Basin is most vividly portrayed where polluted waters cascade over Niagara Falls before the eyes of millions of visitors and bathe tourists riding the "Maid of the Mist" in a miasma bearing the scent of sewage. Plate No. 9-8 shows general areas where poor water quality has affected recreation in the basin.

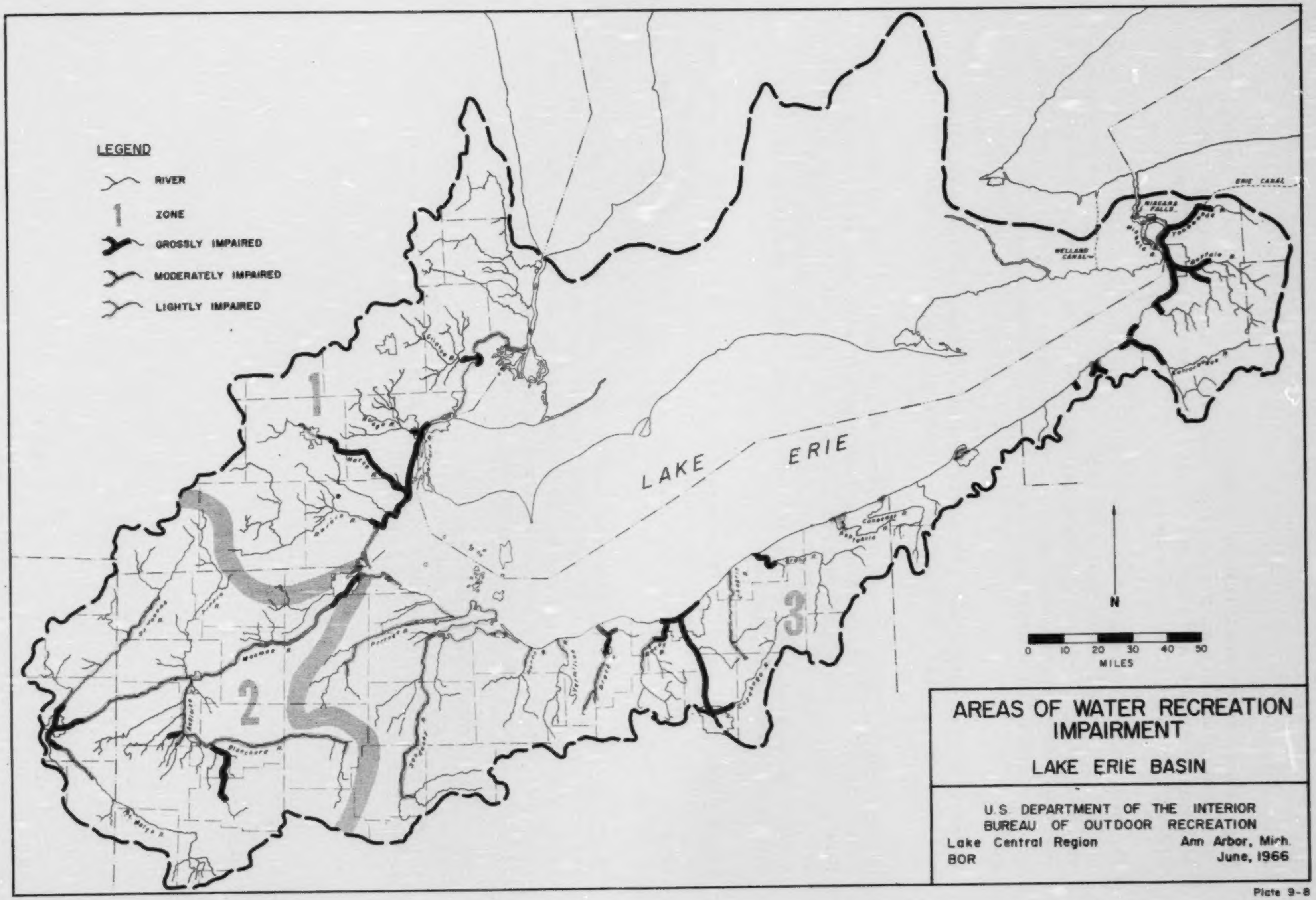
Degrees of impairment have been divided into three categories: light, moderate and gross. Definitions of these categories follow:

Waters lightly impaired were considered to be those on and in which recreational activities involving body contact with the water could be freely engaged in. Such waters, however, are not aesthetically pleasing at least part of the recreational season due to man's activities in the area. These activities would include mining, gravel washing, canning, sewage treatment and similar activities.

Waters moderately impaired were considered to be those on which recreational activities not involving body contact with the water could be freely engaged in. Some persons may engage in water activities involving body contact, but most people shy away from such activity.

Waters grossly impaired were considered to be those on and in which most people would not engage in activities requiring body contact with the water and many would not engage in activities on the water. Much of the time such waters would be aesthetically displeasing due to such conditions as algae growth, dead fish, oil slicks, floating debris and raw sewage.

Among the factors taken into consideration were the past records and reports of such agencies and the Michigan Water Resources Commission, the New York State Department of Health and the Ohio Department of Natural Resources. When available, records of coliform counts were used.


LEGEND
RIVER
1 ZONE
GROSSLY IMPAIRED
MODERATELY IMPAIRED
LIGHTLY IMPAIRED
1
2
3
LAKE ERIE
N
0
10
20
30
40
50
MILES
ERIE CANAL
NIAGARA FALLS
WELLAND CANAL
Niagara R.
Tonawanda R.
Buffalo R.
Cattaraugus R.
Conneaut R.
Ashtabula R.
Grand R.
Chagrin R.
Cuyahoga R.
Rocky R.
Black R.
Vermilion R.
Huron R.
Sandusky R.
Portage R.
Maumee R.
Tiffin R.
St. Joseph R.
Auglaize R.
Blanchard R.
St. Marys R.
Raisin R.
Huron R.
Rouge R.
Clinton R.

AREAS OF WATER RECREATION IMPAIRMENT

LAKE ERIE BASIN

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF OUTDOOR RECREATION
Lake Central Region Ann Arbor, Mich.
BOR June, 1966

Plate 9-8

NEEDS, GOALS AND PROGRAMS FOR CONTINUING SURVEYS AND STUDIES

This study revealed several items which merit further investigation. Though much has been written concerning the fact that high quality water is necessary for body contact water-oriented recreational activities, the availability of data which would prove the assumption is lacking. The number of people swimming in grossly polluted waters in the Lake Erie Basin is estimated to reach into the millions annually, yet little has been done to establish detrimental effects of such action upon them. The nature of the effects and the extent of endemic outbreaks of infectious diseases as a result of this contact should be thoroughly investigated. In this connection, there appears to be a need for further research leading to a determination of the water quality requirements for the various water-oriented recreational activities. To date, such requirements have usually been expressed only in broad descriptive terms based on judgment.

Although the effects of pesticides and herbicides on fish, wildlife and man are presently under study, these effects are poorly understood. Synthetic chemical pollutants entering natural waters are suspected of interfering with aquatic food chains. This affects fish and wildlife production which may lower the quality of the fishing and hunting experience. In addition, such synthetic chemical pollutants create taste and odor problems and may be toxic to the skin. Since significant amounts of synthetic chemicals are often used in the vicinity of recreation areas and may wash into recreational waters,further study of their effects on recreationists is warranted.

Continuing research and study should be implemented to provide public agencies with information concerning potential recreational opportunities along the Lake Erie shoreline. Though it may be determined that suitable areas are presently in private ownership, consideration should be given to their acquisition and development for public recreation purposes. Before the public will accept this course of action, an extensive education program must be implemented.

Studies of the effects of mass recreation on the environment are needed. Conversely, studies on the effect of mass recreation on people should be initiated.

This report has undertaken the study of water-oriented outdoor recreation on the United States portion of the Lake Erie Basin. The relation of the Canadian portion of the basin to the overall picture of outdoor recreation has not been explored. A substantial number of United States basin residents use Canadian facilities. This may decrease the margin between demand and demand satisfaction indicated in Chapter 8. This use is based on seasonal observation of United States automobile license plates at several dispersed Canadian areas on summer weekends. Therefore, to complement this study, the influence of recreation in the Canadian portions of the basin should be given full consideration.

APPENDIX A
Inventory of Existing Recreation Areas as determined by Bureau of Outdoor Recreation Nationwide Plan Inventory Data

GREAT LAKES-ILLINOIS RIVER BASIN PROJECTS
RECREATION INVENTORY
LAKE ERIE BASIN

FEDERAL - STATE													
SITE NO.	NAME	COUNTY	ADJACENT WATER	AREA (acres)	WATER ORIENTED	SWIMMING	BOATING	FISHING	PICNICKING	TENT CAMPING	TRAILER CAMPING	GROUP CAMPING	1963 VISITATION
	ZONE I												
	MICHIGAN												
F 1	Wyandott National Wildlife Ref.	Wayne	Detroit R.	280	X		X	X					6,000
2	St. Clair Flats St. Game Area	St. Clair	St. Clair R.-Lake St. Clair	6,427	X		X	X	X				150,000
3	Port Huron St. Game Area	St. Clair	Black R.	6,070	X		X	X	X	X		X	n.a.
4	Algonac St. Park	St. Clair	St. Clair R.	980	X			X	X	X	X		194,789
5	Rochester-Utica St. Rec. Area	Macomb	Clinton R.	903	X			X	X				487,049
6	Grass Lake Water Access Site	Oakland	Huron River Tributary	28	X			X					1,000
7	Dodge Bros. St. Park No. 4	Oakland	Clinton R. Tributary	140	X	X	X	X	X				570,384
8	Highland St. Rec. Area	Oakland	Huron R. Tributary	5,410	X	X	X	X	X	X	X	X	193,957
9	Pontiac Lake St. Rec. Area	Oakland	Huron R. Tributary	3,604	X	X	X	X	X	X		X	279,253
10	Proud Lake St. Rec. Area	Oakland	Huron R.	3,290	X	X	X	X	X	X	X	X	147,547
11	Bald Mountain St. Rec. Area	Oakland	Clinton R. Tributary	2,576	X	X	X	X	X	X		X	140,192
12	Brighton St. Rec. Area	Livingston	Huron R. Tirbutary	4,561	X	X	X	X	X	X			184,662
13	Unadila Wildlife Area	Livingston	Huron R. Tributary	812	X	X		X	X	X			4,050
14	Gregory St. Game Area	Livingston	Huron R. Tributary	2,441	X		X	X	X	X			6,350
15	Island Lake St. Rec. Area	Livingston	Huron R.	2,910	X	X	X	X	X	X		X	535,910
16	Waterloo St. Rec. Area	Jackson	Huron R. Tributary	15,620	X	X	X	X	X	X	X	X	891,455
17	Sharonville St. Game Area	Jackson	Raisin R.	2,250	X			X	X	X		X	4,050
18	Pinckney St. Rec. Area	Washtenaw	Huron R. Tributary	9,480	X	X	X	X	X	X			307,044
19	Chelsea St. Game Area	Washtenaw	Mill Creek	655	X		X	X					12,400
20	Pointe Mouillee St. Game Area	Monroe	Huron R.-Lake Erie	2,610	X		X	X					115,143
21	Plum Creek St. Game Area	Monroe	Plum Creek-Lake Erie	1,000	X		X	X					1,500
22	Erie St. Game Area	Monroe	Lake Erie	1,794	X	X	X	X	X	X			30,060
23	Petersburg St. Game Area	Monroe	Raisin R. Tributary	440									4,000
24	Sterling Monroe St. Park	Monroe	Lake Erie	630	X	X	X	X	X				315,000
25	Onstead St. Game Area	Lenawee	Raisin R. Tributary	512	X	X	X	X					9,000
26	Walter J. Hayes St. Park	Lenawee	Stony Lake (Raisin R.)	660	X	X	X	X	X	X	X	X	343,797
27	Allens Lake Water Access Site	Lenawee	Raisin R. Tributary	43	X	X	X	X	X				2,000
	ZONE II												
	MICHIGAN												
28	Pittsford St. Game Area	Hillsdale	St. Joesph R. Tributary	2,374	X			X	X	X			12,050
	INDIANA												
	None												
	OHIO												
29	Maumee St. Forest	Fulton	Maumee R. Tributary	3,071									11,100
30	Harrison Lake St. Park	Fulton	Tiffin R. Tributary	196	X	X	X	X	X	X			338,700

GREAT LAKES-ILLINOIS RIVER BASIN PROJECTS
RECREATION INVENTORY
LAKE ERIE BASIN

FEDERAL—STATE													
SITE NO.	NAME	COUNTY	ADJACENT WATER	AREA (acres)	WATER ORIENTED	SWIMMING	BOATING	FISHING	PICNICKING	TENT CAMPING	TRAILER CAMPING	GROUP CAMPING	1963 VISITATION
	ZONE II (con.)												
	OHIO (con.)												
31	Fulton Pond	Fulton	Maumee R. Tributary	34					X				1,000
32	Fallen Timbers St. Memorial	Lucas	Maumee R.	9									34,171
33	Fort Miamis St. Memorial	Lucas	Maumee R.	5									Closed
34	Fort Meigs St. Memorial	Wood	Maumee R.	46					X				n.a.
35	Miami Erie Canal	Henry	Maumee R.	4	X			X					100
36	Meyerholtz Wildlife Area	Henry	Maumee R.	11	X			X	X				5,000
37	Oxbow St. Wildlife Area	Defiance	Tiffin R.	416	X		X	X					13,000
38	Independence Dam St. Park	Defiance	Maumee R.	58	X			X	X	X			203,300
39	Beaver Creek St. Wildlife Area	Williams	Tiffin R. Tributary	154	X			X	X				1,300
40	Hagemann Pond	Williams	Tiffin R.	6	X			X					2,500
41	Reed's Quarry	Paulding	Auglaize R.	4	X			X					100
42	Paulding Ponds Wildlife Area	Paulding	Auglaize R. Tributary	51	X			X	X				2,500
43	Holland Quarry	Van Wert	Auglaize R. Tributary	4	X	X		X					1,000
44	Ottoville Quarry	Putnam	Auglaize R. Tributary	7	X			X					1,000
45	Fort Amanda St. Memorial	Auglaize	Auglaize R. Tributary	10					X				31,000
46	Forty Acre Pond	Auglaize	St. Marys R. Tributary	41	X			X					5,000
47	St. Marys St. Park	Auglaize	St. Marys R. Tributary	15,536	X	X	X	X	X	X			1,121,200
	ZONE III												
	OHIO												
48	Van Buren Lake St. Park	Hancock	Portage R. Tributary	136	X		X	X	X	X			266,300
49	Metzger Marsh Wildlife Area	Lucas	Lake Erie	558	X			X					7,000
50	Crane Creek St. Beach Park	Lucas	Lake Erie	650	X	X			X				82,700
51	Magee Marsh Wildlife Area	Ottawa	Lake Erie	1,665	X			X					5,000
52	Catawba St. Park	Ottawa	Lake Erie	7	X		X	X	X				265,200
53	Little Portage R. Wildlife Area	Ottawa	Portage R.	360	X		X	X					8,000
54	East Harbor St. Park	Ottawa	Lake Erie	1,260	X	X	X		X	X	X	X	1,397,700
55	Toussaint Creek Wildlife Area	Ottawa	Lake Erie Tributary	236	X			X					5,000
56	South Bass Island St. Park	Ottawa	Lake Erie	32	X	X	X	X	X	X			27,700
57	Put-in-Bay Hatchery	Ottawa	Lake Erie	311	X			X					n.a.
58	Kelley's Island St. Park	Erie	Lake Erie	412	X	X		X		X			n.a.
59	Kelley's Island St. Memorial	Erie	Lake Erie	4									17,575
F 60	Perry's Victory National Monument	Ottawa	Lake Erie	21	X			X					75,000
F 61	Ottawa National Wildlife Ref.	Ottawa	Lake Erie Tributary	200									5,000
62	Aldrich Pond Wildlife Area	Sandusky	Sandusky Bay Tributary	40	X		X	X					2,500
63	Miller Blue Hole	Sandusky	Sandusky Bay Tributary	13	X			X					100
64	Hayes St. Memorial	Sandusky	Sandusky R.	26									87,550
65	Milan Wildlife Area	Erie	Huron R. Tributary	296	X	X		X	X				1,600
66	Rest Haven Wildlife Area	Erie	Sandusky Bay Tributary	2,211	X			X	X				15,000
67	Basic Incorporated	Seneca	Sandusky R. Tributary	1,253									2,500

GREAT LAKES-ILLINOIS RIVER BASIN PROJECTS
RECREATION INVENTORY
LAKE ERIE BASIN

FEDERAL-STATE													
SITE NO.	NAME	COUNTY	ADJACENT WATER	AREA (acres)	WATER ORIENTED	SWIMMING	BOATING	FISHING	PICNICKING	TENT CAMPING	TRAILER CAMPING	GROUP CAMPING	1965 VISITATION
	ZONE III (con.)												
	OHIO (con.)												
68	Wyandot Wildlife Area	Wyandot	Sandusky R. Tributary	339	X			X					1,000
69	Old Indian Mill St. Memorial	Wyandot	Sandusky R. Tributary	2									(closed)
70	Killdeer Plains Wildlife Area	Wyandot	Sandusky R. Tributary	5,470	X		X	X	X				30,000
71	Willard Marsh Wildlife Area	Huron	Huron R. Tributary	1,676									5,000
72	Wellington Wildlife Area	Lorain	Black R. Tributary	200						X			2,000
73	Findley St. Park	Lorain	Black R. Tributary	910	X	X	X	X	X	X			264,100
74	Spencer Lake Wildlife Area	Medina	Black R. Tributary	596	X			X	X				4,000
75	Auburn Marsh Wildlife Area	Geauga	Chagrin R. Tributary	431					X				6,000
76	Punderson Lake St. Park	Geauga	Chagrin R. Tributary	505	X		X	X	X				528,700
77	Aquilla Lake Wildlife Area	Geauga	Chagrin R. Tributary	69	X			X	X				5,000
78	Hamblen Orchard Wildlife Area	Geauga	Chagrin R. Tributary	842	X			X	X				8,000
79	Big Creek St. Reserve	Geauga	Chagrin R. Tributary	565		(Undeveloped)							
80	Chapin St. Forest	Lake	Chagrin R. Tributary	362									1,550
81	Headlands St. Beach Park	Lake	Lake Erie	125	X	X			X				614,000
82	Grand River Wildlife Area	Trumbull	Grand River	5,200	X			X	X				10,000
83	Orwell Wildlife Area	Ashtabula	Grand R. Tributary	197	X			X	X				1,000
84	New Lyme Wildlife Area	Ashtabula	Grand R. Tributary	530					X				1,200
	PENNSYLVANIA												
85	St. Game Lands	Crawford	Lake Erie Tributary	1,909									n.a.
86	St. Game Lands	Crawford	Lake Erie Tributary	2,041									n.a.
87	Presque Isle St. Park	Erie	Lake Erie	3,200	X	X	X	X	X				3,257,700
	NEW YORK												
88	Chautauqua Reforestation Area	Chautauqua	Lake Erie Tributary	2,188	X	X			X	X			n.a.
89	Lake Erie St. Park	Chautauqua	Lake Erie	355	X	X	X	X	X	X	X		53,500
90	Cattaraugus Reforestation Area	Cattaraugus	Cattaraugus Creek Tributary	5,888	X	X			X	X			n.a.
91	Evangola St. Park	Erie	Lake Erie	701	X	X			X	X	X	X	209,160
92	Beaver Island St. Park	Erie	Lake Erie	918	X	X			X				630,010
93	Buckhorn Island St. Park	Erie	Niagara R.	897	X			X	X				112,600
94	Big Six Mile Creek Boat Basin	Erie	Niagara R.	18	X		X						n.a.
95	Niagara Reservation	Niagara	Niagara R.	433					X				4,348,700
96	Whirlpool St. Park	Niagara	Niagara R.	120					X				546,500
97	Devil's Hole St. Park	Niagara	Niagara R.	42					X				275,350
98	Oak Orchard Game Area	Genesee	Tonawanda Creek Tributary	2,500	X			X	X				n.a.
99	Tonawanda Game Area	Genesee	Tonawanda Creek Tributary	2,732									n.a.
100	Carlton Hill Multiple Use Area	Wyoming	Tonawanda Creek Tributary	1,752					X				n.a.

GREAT LAKES-ILLINOIS RIVER BASIN PROJECTS
RECREATION INVENTORY
LAKE ERIE BASIN

LOCAL													
SITE NO.	NAME	COUNTY	ADJACENT WATER	AREA (acres)	WATER ORIENTED	SWIMMING	BOATING	FISHING	PICNICKING	TENT CAMPING	TRAILER CAMPING	GROUP CAMPING	1963 VISITATION
	ZONE I												
	MICHIGAN												
1	Goodells	St. Clair	Pine R.	370					X				n.a.
2	Port Huron Twp. Park	St. Clair	Black R.	48	X		X	X	X				n.a.
3	Marine City Park	St. Clair	St. Clair R.	n.a.	X	X							n.a.
4	New Baltimore Park	St. Clair	Lake St. Clair	n.a.	X	X							n.a.
5	General Squire Park	Lapeer	Belle R.	80					X				n.a.
6	Stony Creek Metro. Park	Macomb	Clinton R. Tributary	3,455	X	X	X	X	X			X	302,000
7	Metropolitan Beach	Macomb	Lake St. Clair	536	X	X	X	X	X				1,4[illegible]7,277
8	Memorial Park	Macomb	Lake St. Clair	27	X	X		X	X				86,000
9	Recreation Center Park	Macomb	Lake St. Clair	18	X	X	X		X				140,000
10	Municipal Park	Macomb	Lake St. Clair	11	X		X		X				28,000
11	Grosse Pointe Park	Wayne	Lake St. Clair	6	X	X	X		X				n.a.
12	Grosse Pointe Park Park	Wayne	Lake St. Clair	4	X	X	X		X				n.a.
13	Grosse Pointe Farms Park	Wayne	Lake St. Clair	n.a.	X	X	X						n.a.
14	Grosse Pointe Shores Park	Wayne	Lake St. Clair	n.a.	X	X	X						n.a.
15	Grosse Pointe Woods Park	Wayne	Lake St. Clair	n.a.	X		X						n.a.
16	Belle Isle Park	Wayne	Detroit R.	982	X	X	X	X	X				9,114,000
17	Memorial Park	Wayne	Unknown	34	X		X	X					131,250
18	Vaughn Reid Memorial Park	Wayne	Unknown	19	X		X						n.a.
19	Peter Maheras Memorial Playfield	Wayne	Unknown	53	X		X	X	X				2,002,500
20	Riverfront Lakewood East Park	Wayne	Unknown	28	X		X	X	X				495,000
21	George Engle Memorial Park	Wayne	Unknown	33	X		X		X				343,800
22	Ecorse Park	Wayne	Detroit R.	n.a.	X		X						n.a.
23	Wyandotte Launching Site	Wayne	Detroit R.	n.a.	X		X						n.a.
24	Elizabeth County Park	Wayne	Detroit R.	162	X		X	X	X				660,000
25	Oakwoods Metro. Park	Wayne	Huron R.	1,426		(undeveloped)							
26	Willow Metro. Park	Wayne	Huron R.	1,285		(undeveloped)							
27	Huron R. County Park	Wayne	Huron R.	20					X				270,000
28	Lower Huron Metro. Park	Wayne	Huron R.	1,045	X	X	X	X	X			X	1,562,991
29	Veterans Memorial County Park	Wayne	Huron R.	13									200,000
30	Lower Rouge County Parkway	Wayne	Rouge R.	965					X				510,000
31	William P. Holliday County Park	Wayne	Detroit R. Tributary	491								X	80,300
32	Middle Rouge County Parkway	Wayne	Rouge R.	2,323					X			X	12,259,800
33	Bell Creek County Park	Wayne	Detroit R. Tributary	64					X				600,000
34	Kennedy Memorial County Park	Wayne	Detroit R. Tributary	58					X				170,000
35	Crooks Road Farm	Oakland	Rouge R. Tributary	110						X			n.a.
36	Hawthorn Park	Oakland	Rouge R. Tributary	110	X		X	X	X				n.a.
37	Beaudette Park	Oakland	Rouge R. Tributary	40	X		X	X	X				n.a.
38	Wilson Park	Oakland	Rouge R. Tributary	126	X		X						n.a.
39	Marsh Bank Metro. Park	Oakland	Huron R. Tributary	115					X				51,800
40	Camp Dearborn	Oakland	Huron R. Tributary	626	X	X	X	X	X	X		X	600,000
41	Kensington Metro. Park	Oakland	Huron R.	4,222	X	X	X	X	X			X	2,134,493
42	Novi Twp. Park	Oakland	Rouge R. Tributary	28	X	X	X		X	X			n.a.
43	Brighton Summer Camp	Livingston	Huron R.	206	X	X		X	X			X	11,420

GREAT LAKES-ILLINOIS RIVER BASIN PROJECTS
RECREATION INVENTORY
LAKE ERIE BASIN

LOCAL													
SITE NO.	NAME	COUNTY	ADJACENT WATER	AREA (acres)	WATER ORIENTED	SWIMMING	BOATING	FISHING	PICNICKING	TENT CAMPING	TRAILER CAMPING	GROUP CAMPING	1963 VISITATION
	ZONE I (con.)												
	MICHIGAN (con.)												
44	Ore Lake	Livingston	Huron R. Tributary	1,520		(undeveloped)							
45	Hudson Mills Metro. Park	Washtenaw	Huron R.	1,024	X		X	X	X				40,000
46	Delhi Metro. Park	Washtenaw	Huron R.	47	X		X	X	X				35,000
47	Dexter-Huron Metro. Park	Washtenaw	Huron R.	114	X		X	X	X				50,000
48	Park Washtenaw of Lyndon	Washtenaw	Huron R. Tributary	205					X				n.a.
49	Gallup Lake Park	Washtenaw	Huron R. Tributary	14	X		X	X	X				12,000
50	Dolph Park	Washtenaw	Huron R. Tributary	26	X		X	X					2,000
51	Vineyard Lake Park	Jackson	Raisin R.	15	X	X	X	X	X	X			n.a.
52	Stony Point Park	Monroe	Lake Erie	n.a.	X	X			X				n.a.
	ZONE II												
	MICHIGAN												
	None												
	INDIANA												
53	City Utilities Park	Allen	Maumee R. or Tributary	46	X		X	X	X	X	X		53,655
54	East Swinney Park	Allen	Maumee R. or Tributary	46	X		X	X	X				56,457
55	Shoaff Park	Allen	Maumee R. or Tributary	169	X		X	X	X	X		X	120,988
56	West Swinney Park	Allen	Maumee R. or Tributary	48	X	X	X		X				30,637
57	Cedarville Reservoir	Allen	St. Joseph R.	460	X		X	X	X				n.a.
	OHIO												
58	Schoonover Park	Allen	Ottawa R. Tributary	51	X	X	X	X	X				25,000
59	Lima Lake	Allen	Ottawa R.	86	X			X					5,000
60	Lost Creek Reservoir	Allen	Ottawa R.	113	X			X					7,000
61	Metzger Reservoir	Allen	Ottawa R.	168	X			X					8,000
62	Ferguson Lake	Allen	Ottawa R.	315	X			X					10,000
63	Findlay Reservoir	Hancock	Blanchard R. Tributary	188	X			X					6,000
64	Providence Metro. Park	Lucas	Maumee R.	320	X		X	X	X				29,203
65	Oak Openings Metro. Park	Lucas	Maumee R. Tributary	3,215					X				203,197
66	Bend View Metro. Park	Lucas	Maumee R.	50		(undeveloped)							
67	Secor Metro. Park	Lucas	Maumee R. Tributary	501					X				156,000
68	Farnsworth Metro. Park	Lucas	Maumee R.	40	X		X	X	X			X	38,187
69	Side Cut Metro. Park	Lucas	Maumee R.	100	X			X	X				120,935
70	Swan Creek Metro. Park	Lucas	Maumee R. Tributary	108		(undeveloped)							
71	Cullen Park and Marina	Lucas	Maumee R.	16	X		X	X	X				n.a.
72	Bay View Park	Lucas	Maumee R.	296					X				n.a.
73	Walbridge Park	Lucas	Maumee R.	100	X		X	X	X				n.a.

GREAT LAKES-ILLINOIS RIVER BASIN PROJECTS
RECREATION INVENTORY
LAKE ERIE BASIN

LOCAL													
SITE NO.	NAME	COUNTY	ADJACENT WATER	AREA (acres)	WATER ORIENTED	SWIMMING	BOATING	FISHING	PICNICKING	TENT CAMPING	TRAILER CAMPING	GROUP CAMPING	1963 VISITATION
	ZONE III												
	OHIO												
74	Pearson Metro. Park	Lucas	Lake Erie Tributary	317	X			X	X			X	1,126,307
75	Port Clinton City Park	Ottawa	Lake Erie	n.a.	X	X			X				n.a.
76	Riley Reservoir	Crawford	Sandusky R. Tributary	31	X			X					4,000
77	Bucyrus Reservoir 1 and 2	Crawford	Sandusky R. Tributary	75	X		X	X	X				6,000
78	Huron City Park	Erie	Lake Erie	n.a.					X				n.a.
79	Vermilion City Park	Erie	Lake Erie	22					X				n.a.
80	Vermilion R. Valley Metro. Park	Lorain	Vermilion R.	125	X			X	X	X	X	X	647,039
81	Charlemont Creek Metro. Park	Lorain	Black R. Tributary	452		(undeveloped)							
82	Carlisle West Branch Metro. Park	Lorain	Black R. Tributary	572		(undeveloped)							
83	Carlisle East Branch Metro. Park	Lorain	Black R. Tributary	176	X			X					20,000
84	North Black River Metro. Park	Lorain	Black R. Tributary	504		(undeveloped)							
85	Sheffield French Creek Metro. Park	Lorain	Black R. Tributary	394		(undeveloped)							
86	Lakeview Park	Lorain	Lake Erie Tributary	42	X	X		X	X				250,000
87	Sheffield Lake Park	Lorain	Lake Erie	n.a.									n.a.
88	Avon Lake Park	Lorain	Lake Erie	2									n.a.
89	Huntington Metro. Park	Cuyahoga	Lake Erie	105	X	X	X	X	X				434,100
90	Bradley Woods Metro. Park	Cuyahoga	Rocky R. Tributary	720					X				58,000
91	Edgewater Park	Cuyahoga	Lake Erie	157	X	X	X	X	X				1,200,000
92	Rocky River Metro. Park	Cuyahoga	Rocky R.	4,933	X	X	X	X	X			X	6,825,200
93	Big Creek Metro. Park	Cuyahoga	Big Creek-Lake Erie	370					X				275,800
94	Brecksville-Royalton Parkway	Cuyahoga	Cuyahoge R.	262					X				n.a.
95	Brecksville Metro. Park	Cuyahoga	Cuyahoga R.	2,479					X			X	569,300
96	Brecksville-Bedford Parkway	Cuyahoga	Cuyahoga R.	547	X			X	X				n.a.
97	Bedford Metro. Park	Cuyahoga	Cuyahoga R.	1,335	X			X	X				827,100
98	Chagrin Valley Metro. Park	Cuyahoga	Chagrin R.	500									n.a.
99	South Chagrin Metro. Park	Cuyahoga	Chagrin R.	547	X			X	X	X			679,000
100	Bedford-South Chagrin Parkway	Cuyahoga	Chagrin R.	714	X			X	X				n.a.
101	Shaker Heights Park Area	Cuyahoga	Doan Brook-Lake Erie	115	X		X	X					n.a.
102	North Chagrin Metro. Park	Cuyahoga	Chagrin R.	1,703	X	X		X	X				1,423,500
103	Euclid Creek	Cuyahoga	Lake Erie Tributary	351					X				548,000
104	Gordon Park	Cuyahoga	Lake Erie	119	X		X	X	X				800,000
105	Wildwood Park	Cuyahoga	Lake Erie Tributary	22	X	X	X	X	X				200,000
106	White City Park	Cuyahoga	Lake Erie	10	X	X		X	X				350,000
107	Lake Shore Park	Cuyahoga	Lake Erie	30	X		X	X	X				9,600
108	Euclid Beach	Cuyahoga	Lake Erie	n.a.									n.a.
109	Hinckley Metro. Park	Medina	Hinckley Lake-Rocky R.	1,865	X	X	X	X	X			X	1,499,100
110	Furnace Run Metro. Park	Summit	Cuyahoga R.	825					X				32,000
111	Deep Lock Quarry Metro. Park	Summit	Cuyahoga R.	165									8,000
112	Virginia Kendall Metro. Park	Summit	Cuyahoga R.	1,575	X			X	X				165,000
113	Sand Run Metro. Park	Summit	Cuyahoga R.	862					X				175,000
114	Gorge Metro. Park	Summit	Cuyahoga R.	245	X			X	X				90,000
115	Goodyear Heigths Metro. Park	Summit	Cuyahoga R.	352	X	X		X	X				190,000
116	Mogadore Reservoir	Portage	Cuyahoga R.	2,434	X	X	X	X	X				18,000

GREAT LAKES-ILLINOIS RIVER BASIN PROJECTS
RECREATION INVENTORY
LAKE ERIE BASIN

LOCAL													
SITE NO.	NAME	COUNTY	ADJACENT WATER	AREA (acres)	WATER ORIENTED	SWIMMING	BOATING	FISHING	PICNICKING	TENT CAMPING	TRAILER CAMPING	GROUP CAMPING	1963 VISITATION
	ZONE III (con.)												
	OHIO (con.)												
117	Ladue Reservoir	Geauga	Cuyahoga R.	3,349	X		X	X					8,000
118	East Branch Reservoir	Geauga	Cuyahoga R.	1,105	X		X	X					10,000
119	Daniels Park	Lake	Chagrin R.	n.a.	X	X		X	X				n.a.
120	Mentor Twp. Park	Lake	Lake Erie	10	X	X		X					n.a.
121	Fairport Memorial Beach	Lake	Lake Erie	n.a.	X	X		X	X				n.a.
122	Painesville Twp. Park	Lake	Lake Erie	n.a.	X	X			X				n.a.
123	Wyman Metro. Park	Lake	Grand R.	49	X			X	X				4,000
124	Grand River Metro. Park	Lake	Grand R.	74		(undeveloped)							
125	Indian Point Metro. Park	Lake	Grand R.	30	X		X	X	X				4,000
126	Hell Hollow Metro. Park	Lake	Grand R.	367					X				3,500
127	Madison River Road Metro. Park	Lake	Grand R.	29		(undeveloped)							
128	Hidden Valley Metro. Park	Lake	Grand R.	65	X	X	X	X	X				6,000
129	Hogback Ridge Metro. Park	Lake	Grand R.	85					X				2,000
130	Perry Twp. Park	Lake	Lake Erie	12	X	X	X	X	X	X	X		n.a.
131	Tuttle Park	Lake	Lake Erie	n.a.	X	X			X				n.a.
132	Madison Twp. Park	Lake	Lake Erie	n.a.	X	X			X				n.a.
133	Geneva-on-the-Lake	Ashtabula	Lake Erie	n.a.			(n.a.)						n.a.
134	Geneva Twp. Park	Ashtabula	Lake Erie	n.a.			(n.a.)						n.a.
135	Saybrook Twp. Park	Ashtabula	Lake Erie	n.a.			(n.a.)						n.a.
136	Walnut Park	Ashtabula	Lake Erie	n.a.			(n.a.)						n.a.
137	Lakeshore Park	Ashtabula	Lake Erie	n.a.			(n.a.)						n.a.
138	Conneaut Twp. Park	Ashtabula	Lake Erie	n.a.			(n.a.)						n.a.
139	Lakeview Park	Ashtabula	Lake Erie	n.a.			(n.a.)						n.a.
	PENNSYLVANIA												
140	Lake Erie Community Park	Erie	Lake Erie	110	X	X			X				n.a.
141	Orchard Beach	Erie	Lake Erie	n.a.	X	X							n.a.
	NEW YORK												
142	Ripley Beach	Chautauqua	Lake Erie	n.a.	X	X							n.a.
143	Point Gratiot Beach	Chautauqua	Lake Erie	n.a.	X	X							n.a.
144	Dunkirk Beach	Chautauqua	Lake Erie	n.a.	X	X							n.a.
145	Wright Park Beach	Chautauqua	Lake Erie	n.a.	X	X							n.a.
146	Sheridan Park	Chautauqua	Lake Erie	n.a.	X	X							n.a.
147	Miller's Beach	Erie	Lake Erie	n.a.	X	X							n.a.
148	Wide Beach	Erie	Lake Erie	n.a.	X	X							n.a.
149	Pt. Breeze Beach	Erie	Lake Erie	n.a.	X	X							n.a.
150	Evans Town Park	Erie	Lake Erie	n.a.	X	X							n.a.
151	Buffalo Municipal Beach	Erie	Lake Erie	n.a.	X	X							n.a.
152	Chestnut Ridge County Park	Erie	North Creek Tributary	1,200					X				868,760
153	Emery County Park	Erie	Cayuga Creek Tributary	331					X				559,220

GREAT LAKES-ILLINOIS RIVER BASIN PROJECTS
RECREATION INVENTORY
LAKE ERIE BASIN

LOCAL

SITE NO.	NAME	COUNTY	ADJACENT WATER	AREA (acres)	WATER ORIENTED	SWIMMING	BOATING	FISHING	PICNICKING	TENT CAMPING	TRAILER CAMPING	GROUP CAMPING	1963 VISITATION
	ZONE III (con.)												
	NEW YORK (con.)												
154	Elma Meadows County Park	Erie	Cayuga Creek Tributary	204					X				53,864
155	Como Lake County Park	Erie	Cayuga Creek Tributary	325					X				602,996
156	Outer Harbor Area	Erie	Lake Erie	n.a.	X	X							n.a.
157	Akron Falls County Park	Erie	Tonawanda Creek	137					X				262,897
158	Ellicott Creek County Park	Erie	Ellicott Creek	165					X				560,669
159	Oppenheim County Park	Niagara	Niagara R. Tributary	75					X				10,000

APPENDIX B
Bibliography

Publications from which material was utilized directly are referenced in the report to the bibliography by number. Other material listed in the bibliography not so referenced was reviewed and considered in connection with the preparation of this report.

BIBLIOGRAPHY

1. Automobile Association of America, "Michigan Outdoor Guide." Detroit, Michigan, Undated. 64 p.

2. Baird, Willard, This is our Michigan, Federated Publications, Inc., Battle Creek, Michigan, 1959. 107 p.

3. Bakken Gail, "Open Door to All of Michigan's Huge Water Wonderland." Outboard Magazine, 1961. 15 p.

4. Batchelor, W. C. (prepared for Cuyahoga Falls Park and Recreation Board and Board of Education), "A Master Plan of Park, Recreation, and Outdoor School Facilities for the City of Cuyahoga Falls." Columbus, Ohio, 1960. 115 p.

5. Brown, C. J. D. "Michigan Lakes and Streams - Fish Division Pamphlet No. 24." Lansing, Michigan, 1957. 7 p.

6. Central National Bank of Cleveland, "Cleveland and Northeast Ohio Economic Data Book." Cleveland, Ohio, Undated. 95 p.

7. Chautauqua County Planning Board and Department of Planning, "A Dialogue Plan - Chautauqua County, New York." Mayville, New York, 1963. 59 p.

8. _______________, "Pattern of Use." Mayville, New York, 1962. 117 p.

9. City Planning Associates - East Inc., "Buffalo Master Plan." Buffalo, New York, 1964. 120 p.

10. _______________, "Planning Proposals - Buffalo Master Plan." Buffalo, New York, 1964. 120 p.

11. Clawson, Marion, and others, Land for the Future, Resources for the Future, Inc., Johns Hopkins Press, Baltimore, Maryland, 1960. 500 p.

12. Cleveland Regional Planning Commission (prepared for the Cleveland Metropolitan Park District), "New Gems for the Emerald Necklace." Cleveland, Ohio, 1961. 96 p.

13. Cleveland Regional Planning Commission, "Open Space for Our Citified County," Cleveland, Ohio, 1964. 112 p.

14. Community Planning Services, Inc., (prepared for Pennsylvania State Planning Board), "Project 70." Monroeville, Pennsylvania, Undated. 16 p.

15. Detroit Metropolitan Area Regional Planning Commission, "A 1980 Regional Recreation Land Plan for the Huron-Clinton Metropolitan Authority." Detroit, Michigan, 1964. 71 p.

16. ______________, "Park Users Survey." Detroit, Michigan, 1959. 57 p.

17. ______________, "Regional Recreational Lands Plan." Detroit, Michigan, 1960. 8 p.

18. Elmer, Arthur C., "Preliminary and Generalized Report - Programming Michigan's Future State Park and Recreation Areas Needs." Michigan Department of Conservation, Lansing, Michigan, Undated. 7 p.

19. Erie County Conservation Needs Committee, "Erie County Soil and Water Conservation Needs Inventory." East Aurora, New York, 1964. 13 p.

20. Erie County Planning Commission, "Future Land Use." Erie, Pennsylvania, 1963. 21 p.

21. ______________, "Parks and Open Space Plan." Erie, Pennsylvania, 1964. 28 p.

22. Findell, V. E. and others, "Michigan's Forest Resources." Lake States Forest Experiment Station, Forest Service, St. Paul, Minnesota, 1960. 46 p.

23. Fisk, George, Leisure Spending Behavior, University of Pennsylvania Press, Philadelphia, Pennsylvania, 1963. 194 p.

24. Fox, Irving K., and Herfindahl, O. C., "Attainment of Efficiency in Satisfying Demand for Water Resources." Resources for the Future, Inc., Reprint No. 46, Washington, D. C., 1964. 9 p.

25. Hatcher, Harlan H., Lake Erie, Indianapolis, Bobbs-Merrill, 1945. 216 p.

26. Herfindahl, Orris C. & Kneese, Allen V., Quality of the Environment, Resources for the Future, Inc., John Hopkins Press, Baltimore, Maryland, 1965. 96 p.

27. Hill, Carroll V., and Associates (prepared for Lake County Planning Commission), "A Report Upon Schools, Parks, and Recreation Areas, Lake County, Ohio." Dayton, Ohio, 1958. 61 p.

28. ______________, "A Summary Report on the Comprehensive Plan for Lake County, Ohio." Dayton, Ohio, 1959. 81 p.

29. Hudgins, Bert, "Michigan Geographic Backgrounds in the Development of the Commonwealth." Detroit, Michigan, 1961. 116 p.

30. Humphrys, Clifford R., "Water Supply - Water Demand, 1960 - 1980." Department of Resource Development, Michigan State University, East Lansing, Michigan, 1959. 30 p.

31. Indiana Department of Conservation, "Guide to Indiana's Lakes." Indianapolis, Indiana, 1955. 77 p.

32. Indiana State Board of Health, "Directory of Organized Camps in Indiana." Indianapolis, Indiana, 1963. 53 p.

33. _____________, "Recreation in Indiana." Blue Print Committee for the Governor's Committee on Recreation, Indianapolis, Indiana, Undated. 96 p.

34. Indiana State Board of Health and Stream Pollution Control Board, "Indiana Water Quality, 1962." Indianapolis, Indiana, 1962. 84 p.

35. Indiana State Chamber of Commerce, "Statistical Abstract of Indiana Counties." Indianapolis, Indiana, 1963. 200 p.

36. Kneese, Allen V., Economics of Regional Water Quality Management. Johns Hopkins Press, Baltimore, Maryland, 1964. 232 p.

37. _____________, "Water Pollution - Economic Aspects and Research Needs." Resources for the Future, Inc., Washington, D. C., 1962 107 p.

38. Lister-Fonoroff and Associates, (prepared for Geauga County Planning Commission, "Geauga Ohio General Land Use Plan," Chagrin Falls, Ohio, 1962. 33 p.

39. Lorain County Regional Planning Commission, "A Recreation Plan for Avon Lake." Elyria, Ohio, 1963. 23 p.

40. _____________, "Interim Park Report." Elyria, Ohio, Undated. 9 p.

41. _____________, "Park and Recreation Plan for Vermilion, Ohio." Elyria, Ohio. 24 p.

42. _____________, "Parks and Recreation - A Plan for Lorain County." Elyria, Ohio, 1959. 73 p.

43. McCurdy, Dwight, R., "Ohio's Private Outdoor and Forest Recreation Enterprises." Central States Forest Experiment Station, Forest Service, Columbus, Ohio, 1963. 49 p.

44. McKee, J. E. and Wolf, H. W., ed., Water Quality Criteria. California State Water Quality Control Board, Second Edition, Publication No. 3-A, Sacramento, California, 1963. 548 p.

45. Median-Summit-Portage Tri-County Regional Planning Commission, "Recreation and Open Space-Study Report No. 2." Akron, Ohio, 1960. 34 p.

46. ______________, "Regional Land Use Plan-Study Report No. 25." Akron, Ohio, 1963. 115 p.

47. ______________, "Water Resource Development Plan-Study Report No. 27." Akron, Ohio, 1963. 205 p.

48. Michigan Conservation Commission, "Official Statement: State Park Revenue Bonds, Series III." Lansing, Michigan, 1963. 42 p.

49. Michigan Department of Conservation, "1964 Directory of Water Access Sites." Lansing, Michigan, 1964. 20 p.

50. ______________, "1964 Michigan Campground Directory." Lansing, Michigan, 1964. 16 p.

51. ______________, "Public Fishing Sites." Lansing, Michigan, 1963. 18 p.

52. ______________, "Statement of Recreation Policy for the State of Michigan." Lansing, Michigan, 1961. 10 p.

53. Michigan Department of Conservation and Michigan State Planning Commission, "Michigan's Water Problems." Lansing, Michigan, 1944. 118 p.

54. Michigan Department of Conservation and Michigan Tourist Council, "Michigan Canoe Trails." Lansing, Michigan, 1964. 2 p.

55. Michigan Department of Economic Development, Research Division, "Economic Data Sheets." Lansing, Michigan, 1963. 608 p.

56. Michigan Department of Social Welfare, "1964 Directory of Camps for Children." Lansing, Michigan, 1964. 93 p.

57. Michigan Forest Industries, "Michigan Forest Facts." Iron Mountain, Michigan, 1963. 15 p.

58. Michigan Natural Resources Council, "Michigan's Recreation Future." Seventh Annual Conference, Lansing, Michigan, 1962. 53 p.

59. Michigan State Highway Department, Office of Engineering, "I-94 Rest Area Study." Lansing, Michigan, Undated. 128 p.

60. Michigan State Highway Department, "Survey and Services Report - Tourist Information Centers." Lansing, Michigan, 1963. 46 p.

61. Michigan State University Agricultural Experiment Station, East Lansing and Michigan Conservation Needs Committee, "An Inventory of Michigan Soil and Water Conservation Needs." East Lansing, Michigan, Undated. 64 p.

62. Michigan State Waterways Commission Biennial Report, 1960-1962, Detroit, Michigan, 1963. 44 p.

63. Michigan Water Resources Commission, "Michigan and the Great Lakes." Lansing, Michigan, 1963. 31 p.

64. ______________, "Water Resource Conditions and Uses in the Huron River Basin." Lansing, Michigan, 1957. 149 p.

65. ______________, "Water Resource Conditions and Uses in the Michigan Portion of the Maumee River Basin." Lansing, Michigan 1964. 65 p.

66. ______________, "Water Resources of the Clinton River Basin." Lansing, Michigan, 1953. 47 p.

67. New York Conservation Needs Inventory, "New York State Soil and Water Conservation Needs Inventory." Syracuse, New York, 1962. 82 p.

68. New York State Department of Health, Water Pollution Control Board, "Lake Erie-Niagara River Drainage Basin Series - Report No. 1. Big Sister Creek Drainage Basin." Albany, New York, 1951. 14 p.

69. ______________, "-Report No. 2. Silver Creek Drainage Basin." Albany, New York, 1952. 21 p.

70. ______________, "-Report No. 3. Eighteen Mile Creek Drainage Basin." Albany, New York, 1955. 43 p.

71. ______________, "-Report No. 4. Cattaraugus Creek Drainage Basin." Albany, New York, 1957. 85 p.

72. ______________, "-Report No. 5. Cattaraugus Creek (portion in vicinity of Gowanda, New York)." Albany, New York, 1962. 37 p.

73. ______________, "-Report No. 6. Lake Erie (West End) and Tributary Drainage Basins in Chautauqua County." Albany, New York, 1963. 115 p.

74. Niagara County Planning Board, "Sixth Annual Report." Lockport, New York, 1961. 16 p.

75. Oeming, L. F. and others, "Water Resources Conference Proceedings." Lansing, Michigan, 1962. 75 p.

76. Ohio Department of Health, Division of Engineering, "Water Pollution Control in Lake Erie and its Tributaries in Ohio." Columbus, Ohio, 1965, 21 p.

77. Ohio Department of Natural Resources, Division of Parks and Recreation, "Ohio State Parks Travel and Use Surveys." Columbus, Ohio, 1963. 33 p.

78. _______________, Division of Shore Erosion, "Shore Erosion in Ohio." Columbus, Ohio, 1959. 39 p.

79. _______________, Division of Water, "Water Inventory of the Cuyahoga and Chagrin River Basins, Ohio." Columbus, Ohio, 1959. 90 p.

80. _______________, _____, "Water Inventory of the Mahoning and Grand River Basins." Columbus, Ohio, 1961. 90 p.

81. _______________, _____, "Water Inventory of the Maumee River Basin, Ohio." Columbus, Ohio, 1959. 90 p.

82. _______________, Division of Watercraft, "Ohio Boating Facilities and Information Guide." Columbus, Ohio, Undated. 24 p.

83. _______________, "Lake Erie Pollution Survey." Columbus, Ohio, 1953. 200 p.

84. _______________, Public Land Needs for Water Management and Recreation: Progress Report, 1960.

85. Ohio Development Department, "Maumee River Basin Water Pipeline Study." Columbus, Ohio, 1964. 15 p.

86. Ohio Forestry Association, Inc., "Valleys of Opportunity." Columbus, Ohio. 1955. 64 p.

87. Ohio Inter-Agency Committee, "Ohio Facilities and Services for Outdoor Recreation and Education." Columbus, Ohio, Undated. 33 p.

88. Ohio Soil and Water Conservation Needs Committee, "Ohio Soil and Water Conservation Needs Inventory." Columbus, Ohio., 1961. 78 p.

89. Ohio State University, Natural Resources Institute and Office of Community Development, "Proceedings of Ohio Conference on Meeting Outdoor Recreation Needs for the 1960's."Columbus, Ohio, 1961. 97 p.

90. Ottoson, Howard W., ed. Land Use Policy and Problems in the United States, University of Nebraska Press, Lincoln, Nebraska, 1963. 470 p.

91. Outboard Industry Association, "Why They Do/Don't Buy" Chicago, Illinois, 1962. 47 p.

92. Outdoor Recreation Resources Review Commission, "Outdoor Recreation for America." Washington, D. C., U.S. Government Printing Office, 1962. 246 p.

93. ______________, Study Report No. 4, "Shoreline Recreation Resources of the United States." 156 p.

94. ______________, Study Report No. 10, "Water for Recreation - Values and Opportunities." 73 p.

95. ______________, Study Report No. 19, "National Recreation Survey." 394 p.

96. ______________, Study Report No. 20, "Participation in Outdoor Recreation: Factors Affecting Demand Among American Adults." 94 p.

97. ______________, Study Report No. 23, "Projections to the years 1976 and 2000: Economic Growth, Population, Labor Force and Leisure, and Transportation." 434 p.

98. ______________, Study Report No. 26, "Prospective Demand for Outdoor Recreation." 61 p.

99. Pennsylvania State Park and Harbor Commission, "Presque Isle State Park: Beach 11 Water Pollution Study." Erie, Pennsylvania, 1963. 15 p.

100. Perloff, Harvey S. and others, Regions, Resources, and Economic Growth. Resources for the Future, Inc., Johns Hopkins Press, Baltimore, Maryland, 1960. 716 p.

101. Pontiac Parks and Recreation Department, "Parks and Outdoor Recreational Facilities." Pontiac, Michigan, 1960. 66 p.

102. Rowlee, Ace and Polly, "Michigan Campground Guide." Fourth Edition, Wayne Halleck, Battle Creek, Michigan, 1963. 63 p.

103. St. Clair Regional Planning Commission, "Park and Recreation Study for the Port Huron-St. Clair County Metropolitan Region." Port Huron, Michigan, 1960. 37 p.

104. Special Subcommittee on Air and Water Pollution of the Committee on Public Works, "Water Pollution Control." U.S. Senate, 88th Congress, June 1963. (Hearings)

105. Sport Fishing Institute and the Outboard Boating Club of America, "Proceedings-Third National Conference on Access to Recreational Waters." Nashville, Tennessee, 1963. 27 p.

106. Southeastern Michigan Tourist and Publicity Association, "Southeastern Michigan Vacation Guide." Detroit, Michigan, 1958. 124 p.

107. Stephenson, Richard A., "Population and Land Use in Ashtabula County, Ohio." Greenville, North Carolina, 1962. 57 p.

108. Thaden, J. F., "Population of Michigan Counties-Projections to 1970." Institute for Community Development, Michigan State University, Technical Bulletin B-24, East Lansing, Michigan, 1962. 52 p.

109. Thorne, Wynne, ed. *Land and Water Use*, Publication No. 73 of American Association for the Advancement of Science, Washington, D. C., 1963. 364 p.

110. Twardzik, Louis F., "A Recommended Recreation Program for the State of Michigan." East Lansing, Michigan, 1962. 84 p.

U.S. Congress, Senate, Committee on National Water Resources, *Water Resouree Activities in the United States; Report of the Select Committee on National Water Resources*. Washington, D. C., U.S. Government Printing Office, 1960

111. Committee Print No. 3, "National Water Resources and Problems." 42 p.

112. Committee Print No. 17, "Water Recreation Needs in the United States, 1960-2000." 28 p.

113. Committee Print No. 24, "Water Quality Management." 14 p.

114. Committee Print No. 29, "Water Requirements for Pollution Abatement." 28 p.

115. Committee Print No. 30. "Present and Prospective Means for Improved Reuse of Water." 54 p.

116. ______________, _____, Committee on Public Works, *Water Pollution Control; Report of the Air and Water Special Subcommittee, June 17-20, 25, and 26, 1963.* Washington, D. C., Government Printing Office, 1963. 716 p.

117. U.S. Department of Agriculture, *A Place to Live: Yearbook of Agriculture: 1963*. Washington, D. C., Government Printing Office, 1963. 584 p.

118. ______________, *Water: Yearbook of Agriculture: 1955.* Washington, D. C., Government Printing Office, 1955. 751 p.

119. ______________, Forest Service, Central States Forest Experiment Station, "Forest Statistics for the Glaciated Region of Ohio." Columbus, Ohio, 1954. 28 p.

120. U.S. Department of the Army, Corps of Engineers, "Water Resources Development in Michigan." Chicago, Illinois, 1965. 64 p.

121. ______________, "Water Resources Development in New York," New York, New York, 1965. 124 p.

122. ______________, "Water Resources Development in Ohio." Cincinnati, Ohio, 1963. 67 p.

123. ______________, "Water Resources Development in Pennsylvania." New York, New York, 1963. 83 p.

124. U.S. Department of Commerce, Bureau of Census, "County and City Data Book-1962." Washington, D. C., Government Printing Office, 1962. 669 p.

125. U.S. Department of Health, Education, and Welfare, Public Health Service, "Progress Report, 1963 Recreational Season: Water Quality - Recreational Study." Indianapolis, Indiana, 1964. 28 p.

126. ______________, "Report on Pollution of Lake Erie and Its Tributaries - Part 1, Lake Erie." Chicago, Illinois, 1965. 1-50 p.

127. ______________, _____, Part 2, Ohio, Indiana, and Michigan Sources." Chicago, Illinois, 1965. 51-101 p.

128. ______________, _____, Part 3, New York and Pennsylvania Sources." Chicago, Illinois, 1965. 102-122 p.

129. U.S. Department of the Interior, Bureau of Outdoor Recreation, "State Outdoor Recreation Statistics-1962." Washington, D. C., 1963. 53 p.

130. ______________, National Park Service, "Our Fourth Shore-Great Lakes Shoreline Recreation Area Survey." Washington, D. C., Government Printing Office, 1959. 47 p.

131. ______________, _____, "Parks for America." Washington, D. C., Government Printing Office, 1964. 485 p.

132. ______________, _____, Public Recreation Land Needs-Ohio, 1961. 45 p.

133. ______________, _____, "Remaining Shoreline Opportunities in Minnesota, Wisconsin, Illinois, Indiana, Ohio, Michigan, Pennsylvania and New York," 1959. 191 p.

134. ______________, Office of the Secretary, "Quest for Quality," Conservation Yearbook, Washington, D. C. Government Printing Office, 1965. 96 p.

135. Veatch, J. O. and Humphrys, C. R. , Lake Terminology." Department of Resource Development, Agricultural Experiment Station, Bulletin No. 14, Michigan State University, East Lansing, Michigan, 1964. 271 p.

136. Vollmer Associates (prepared for State of New York Conservation Department), "Two-Year Progress Report on Land Acquisition for Parks and Recreation." New York, New York, 1963. 28 p.

137. Whitcomb C. D., "Lake Tour to Picturesque Mackinac." Detroit, Michigan, 1884. 112 p.

138. Wingo, Jr., Lowdon, The Use of Urban Land; Past, Present, and Future, Resources for the Future, Inc., Washington, D. C., 1963. 23 p.

139. Woldorf, Arthur F., "Gazetteer of Lakes and Ponds in Ohio." Ohio Department of Natural Resources, Division of Water, Columbus, Ohio, 1965. 45 p.

140. Wright, Alfred J., Economic Geography of Ohio, Columbus, Ohio, 1957. 245 p.

141. Wright, David G. Public Beaches, American Institute of Park Executives Management Aids, Bulletin No. 51, Wheeling, West Virginia, 1965. 48 p.

142. Wright, Eber L., "The Impact of Urban Development on Farming, Ashtabula County, Ohio." A Thesis for the Degree of Master of Science in Civil Engineering, Case Institute of Technology, Cleveland, Ohio, 1964. 96 p.

ADDENDUM TO BIBLIOGRAPHY

143. Bogue, Donald J., and Beale, Calvin L., *Economic Areas of the United States*, New York, New York, Crowell-Collier Publishing Company, 1961. 1,162 p.

144. Conway, H. McKinley, Jr., *The Weather Handbook*, Atlanta, Georgia, 1963. 255p.

145. Keller, Myrl, "Lake Erie Sport Fishing Survey," Ohio Department of Natural Resources, Ohio, 1964. 18 p.

146. Long, Luman H., Ed., *The World Almanac 1966*. New York, New York, New York World-Telegram and the Sun, 1966. 896 p.

147. Ohio Department of Industrial Development, "Statistical Abstract of Ohio." Ohio, 1960. 239 p.

148. U.S. Department of Agriculture, Economic Research Service, *Major Use of Land and Water in the United States with Special Reference to Agriculture - Summary for 1959*, Agricultural Economic Report No. 13. Washington, D.C., Government Printing Office, 1962. 54 p.

149. U.S. Department of the Interior, Fish and Wildlife Service, *Water Levels of the Great Lakes*. Minneapolis, Minnesota, 1963. 56 p.

150. ____________________, Bureau of Outdoor Recreation, *Water-Oriented Outdoor Recreation in the Illinois River Basin*. Philadelphia, Pennsylvania. 1964. 128 p.

151. U.S. Department of Commerce, Bureau of the Census, *Statistical Abstract of the United States - 1965*. Washington, D.C., Government Printing Office, 1965. 1047 p.

U.S. Department of Commerce, Bureau of the Census, U.S. Census of Population. Washington, D.C., Government Printing Office, 1960

152. "Number of Inhabitants - Indiana" 31 p.

153. "Number of Inhabitants - Michigan" 32 p.

154. "Number of Inhabitants - New York" 40 p.

155. "Number of Inhabitants - Ohio" 44 p.

156. "Number of Inhabitants - Pennsylvania" 50 p.

157. U.S. Department of the Interior, National Park Service, and U.S. Army Engineer District, Philadelphia, Report on the Comprehensive Survey of the Water Resources of the Delaware River Basin, Appendix W, Recreation Needs and Appraisals. Philadelphia, Pennsylvania. 1960 79 p.

158. McCurdy, Dwight R. "Making Woodland Recreation Pay", Society of American Foresters, Washington, D.C., 1964, 156-158 p.

APPENDIX C

Views of Cooperating Agencies

VIEWS OF OTHER INTERESTS

Copies of the preliminary draft of this report were furnished to the State Liaison Officers of each state in the basin and to other interested Federal, state and local governmental agencies for review. Copies of their replies are attached. The comments were appreciated and many portions of the report were revised to reflect them.

One frequently appearing comment concerned the absence of data on hunting. Since hunting and fishing are the primary subjects to which the U. S. Fish and Wildlife Service has addressed itself in their study, it was felt the inclusion of hunting in this report would lead to unnecessary duplication. Hunting is usually participated in apart from other outdoor recreation activities and at a different time of year than most other activities. Fishing, on the other hand, is often participated in along with other outdoor recreation activities such as boating, picnicking and camping. The heaviest fishing activity occurs during the summer months. There are exceptions of course. However, for these reasons, hunting was not considered in this report while fishing was not eliminated from consideration.

Several comments were made relative to lack of detail concerning certain aspects of subjects introduced in the report. This fact is recognized and appreciated; however, it is our feeling the report is an overview of conditions in the basin. It was produced to stimulate thought and action and is not intended to provide the solution to a particular problem in a particular area. In most instances, agencies concerned with specific problems of water quality as it relates to outdoor recreational activities are well aware of the details.

Some comments indicated disagreement with statements made. All comments were carefully considered and changes were made more often than not. Some items in regard to water quality recreational relationships were viewed differently by this agency than by those concerned with other aspects of the water quality.

INDEX OF REPLIES RECEIVED

1. Letter, State of Ohio, Department of Natural Resources, dated June 23, 1966.

2. Letter, State of New York, Conservation Department, dated June 15, 1966.

3. Letter, State of New York, Conservation Department, dated May 27, 1966.

4. Letter, State of Michigan, Water Resources Commission, dated May 12, 1966.

5. Letter, State of Michigan, Department of Conservation, dated May 19, 1966.

6. Letter, Commonwealth of Pennsylvania, Department of Forests and Waters, dated, May 11, 1966.

7. Letter, Huron Clinton Metropolitan Authority, dated May 31, 1966.

8. ~~Letter, U.S. Department of the Interior, Federal Water Pollution Control Administration, dated May 25, 1966.~~

9. ~~Letter, Department of the Interior, Federal Water Pollution Control Administration, dated May 11, 1966~~.

10. Memorandum, Department of the Interior, Fish and Wildlife Service, Bureau of Sport Fisheries and Wildlife, dated April 28, 1966.

11. Memorandum, River Basin Studies Coordinator, Bureau of Commercial Fisheries, dated June 2, 1966.

12. Memorandum, Department of the Interior, Office of the Secretary, Upper Mississippi-Western Great Lakes Area, dated June 17, 1966.

13. Memorandum, Department of the Interior, Office of the Secretary, Ohio River-Appalachian Area, dated June 2, 1966.

14. Letter, Department of the Army, North Central Division, Corps of Engineers, dated May 27, 1966.

15. Letter, Department of the Army, Buffalo District, Corps of Engineers, dated May 25, 1966.

16. Letter, Department of the Army, Detroit District, Corps of Engineers, dated May 6, 1966.

17. Letter, Department of the Army, Lake Survey District, Corps of Engineers, dated June 3, 1966.

18. Letter, U.S. Department of Agriculture, Forest Service, dated April 28, 1966.

19. Letter, State Conservationist, New York, dated April 25, 1966.

20. Letter, State Conservationist, Ohio, dated April 26, 1966.

21. Letter, State Conservationist, Pennsylvania, dated May 16, 1966.

22. Letter, State Conservationist, Michigan, dated May 13, 1966.

23. Letter, State Conservationist, Indiana, dated April 22, 1966.

COPY

SEAL
STATE OF OHIO
DEPARTMENT OF NATURAL RESOURCES
Ohio Departments Building
Columbus 43215

June 23, 1966

Mr. Roman H. Koenings
Regional Director
Bureau of Outdoor Recreation
Lake Central Region
3853 Research Drive
Ann Arbor, Michigan 48104

Dear Mr. Koenings:

We appreicate the opportunity to review your report entitled "Water Oriented Outdoor Recreation - Lake Erie Basin." The report appears to be in good order and we have no comment to make at this time.

We are returning the draft copies, numbers 040, 041, and 043 which were loaned to us. We would like to keep copy number 042 for information purposes if we may.

Sincerely yours,

(Signature)
FRED E. MORR
Director

FEM/bt
Encls. 3

COPY
SEAL

STATE OF NEW YORK
CONSERVATION DEPARTMENT
ALBANY

June 15, 1966

Mr. Roman H. Koenings
Regional Director
Bureau of Outdoor Recreation
Department of the Interior
3853 Research Park Drive
Ann Arbor, Michigan 48104

Ref. D6427GL

Dear Mr. Koenings:

Thank you for your letter of April 14. Review of the preliminary draft report "Water Oriented Outdoor Recreation - Lake Erie Basin" by the various divisions of the Department, has necessitated a delay.

At this time, I do not have any comments except to state that the report reemphasizes the need for boating facilities in the area, noting particularly the lack of boat launching sites and protective harbors of refuge on the New York shoreline of Lake Erie.

I appreciate being given the opportunity to review this draft. If possible, I would like to review the final report, which would include a more detailed analyzation of the Basin.

Sincerely,

(Signature)
Commissioner

Enclosure

COPY
SEAL

STATE OF NEW YORK
CONSERVATION DEPARTMENT Div. of Water Resources
Albany, New York 12226

May 27, 1966

Mr. Roman H. Koenings
Regional Director
Bureau of Outdoor Recreation
3853 Research Park Drive
Ann Arbor, Michigan

Dear Mr. Koenings:

The preliminary draft report "Water Oriented Outdoor Recreation - Lake Erie Basin" has been reviewed as requested.

From an overall view point, the report fulfills the requirments of a framework study. It is felt, however, that the use of this study to evaluate needs and problems of specific regions within the State of New York will be limited. The study might have been more effective if a building block technique had been used in which needs and problems of small individual units within the study area were considered first. These small units could then have been integrated into the basin-wide estimate. We realize that this approach would have required more time and effort, but the result might have been more helpful to local and regional efforts.

Several specific comments follow:

1. Table Nos. 3-4 tabulates by county the number and total size of natural and artificial lakes in the Lake Erie Basin. However, it is not clear whether this tabulation includes all bodies of water or just lakes used for recreational purposes. In addition to clarifying this item, the New York portion of Table 3-4 should be revised to read:

Natural and Artificial Lakes

	Recreational Use (Includes Fishing)		Wildlife Use		Other Purposes		Total	
County	No.	Acreage	No.	Acreage	No.	Acreage	No.	Acreage
Cattaraugus	5	265	8	93	8	82	21	440
Erie	5	49	5	78	17	237	27	364
Wyoming	5	128	5	76	7	261	17	465
Genesee	2	41	4	76	4	113	10	230
Orleans	1	20	-	-	-	-	1	20
Niagara	-	-	-	-	1	3	1	3
*Chautauqua	-	-	-	-	-	-	-	50
TOTAL	18	503	22	323	37	696	77	1572

* Specific entries for Chautauqua not available NOTE: Chautauqua was misspelled in draft

2. Table 7-1 and 7-2 and Appendix A list present and proposed recreational facilities in the Lake Erie Basin. There exist some discrepancies between this inventory and the one made by this office in conjunction with the Erie-Niagara Study. Rather than list them individually, a complete list of state and county facilities is attached separately.

3. In establishing ground rules for determining the Basin's recreation needs, it was decided not to consider recreational facilities outside of the Basin as sources of supply for demand within the Basin. Although the methodology described in Appendix A implicitly allows for excluding these faciltiies, to use this technique for the New York portion of the Basin will yield a very misleading picture of recreational supply and demand.

   The New York portion of the Lake Erie Basin depends largely on facilities outside the Basin to meet in-basin demands. Canadian parks and beaches along Lake Erie, Lake Chautauqua and Allegany State Park serve millions of activity days each year for people living within the Lake Erie Basin. These extensive facilities cannot be excluded from study. It is also quite possible that other regions of the Basin have similar situations which do not permit making this assumption.

4. The section on water quality influences on recreation presented evidence of influences on swimming, boating, and fishing but might have been more effective if tied together with conclusions. Perhaps the conclusions are implied in the examples stated, but they should be explicity stated.

5. Plate 9-8 is a good attempt to show areas of water recreation impairment due to pollution. However, the large scale of the map makes it difficult to read.

6. Tables 7-1 and 7-2 might be included in Appendix A where they could be found easily. Their present location tends to confuse section 7. Possible other tabular information might also be included in the Appendix so it would not interrupt the general text.

Sincerely yours,

(Signature)
F. W. Montanari
Assistant Commissioner

Attachment
cc: John McMahon
Western Region

COPY

STATE OF MICHIGAN
George W. Romney, Governor

SEAL

WATER RESOURCES COMMISSION
Station B
Lansing, Michigan 48913

May 12, 1966

Mr. Roman H. Koenings
Regional Director
Bureau of Outdoor Recreation
Department of the Interior
3853 Research Park Drive
Ann Arbor, Michigan

Dear Mr. Koenings:

We have reviewed your draft report on Water-Oriented Outdoor Recreation as requested by your letter of April 18, 1966.

We are in basic agreement with the observations and conclusions regarding water quality and its effects on recreation which you have presented in the report. It is believed, however, that using definitions shown on page 9-18, the lower Detroit River and the Huron River could not be considered as grossly impaired waters. Plate 9-8 would indicate that they have been so classified by your office. It would also be more accurate on page 9-3, line 51 to state that the studies found the Sterling State Park intermittently polluted not grossly polluted. Page 9-5, line 13 contains a statement that all waste is bypassed around treatment plants during storm runoff. This is not true. The statement could be corrected by deleting the word all.

We appreciate the opportunity to review this report and would be pleased to discuss our comments in further detail if you would so desire.

The report is returned as requested.

Very truly yours,

(Signature)
L. F. Oeming
Executive Secretary

WGT:mc

cc: H. Miller

COPY

STATE OF MICHIGAN
George Romney, Governor

SEAL

DEPARTMENT OF CONSERVATION
Stevens T. Mason Bldg.
Lansing, Michigan 48926

May 19, 1966

Mr. Roman Koenings, Regional Director
Bureau of Outdoor Recreation
Lake Central Region
3853 Research Park Drive
Ann Arbor, Michigan 48104

Dear Mr. Koenings:

This is in response to your letter of April 14 requesting a review and comments of the preliminary draft of your report on "Water-Oriented Outdoor Recreation--Lake Erie Basin".

We are attaching comments from the Fish, Game, Parks, and Recreation Resource Planning Divisions of the Department of Conservation. Waterways Commission has been contacted and will send its comments directly to you. It is our understanding that your office has provided the Water Resources Commission with a report and that a direct reply will be received from that agency.

Because of time, no attempt has been made to consolidate these comments and you will note some duplication.

Thank you for the opportunity to review your report and make comments. Should you wish to discuss any of the points with staff members, please feel free to do so. Copies of the books will be returned to you under separate cover.

Very truly yours,

(Signature)
Norman F. Smith, Chief
Recreation Resource Planning Division

NFS:hw

Enclosures

cc: Messrs. Harris
Wilson

COPY
SEAL

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF FORESTS AND WATERS
Harrisburg
17120

May 11, 1966
In reply refer to
SP

Mr. Roman H. Koenings, Regional Director
Bureau of Outdoor Recreation
U. S. Department of the Interior
Lake Central Region
3853 Research Park Drive
Ann Arbor, Michigan 48104

REFERENCE: D6427GL

Dear Mr. Koenings:

We have reviewed the preliminary draft of the Bureau of Outdoor Recreation's report "Water Oriented Outdoor Recreation - Lake Erie Basin".

In accordance with your request, we submit the following comments:

1. Page 9-8, line 43. The reference to the coliform count that reads 1,000 per m.l. should read 1,000 per 100 m.l.

2. Pages 10-1 through 10-3. "Needs, Goals, and Programs for Continuing Surveys and Studies". It is recommended that this chapter be rewritten to reflect the necessity for pollution abatement as the primary concern of all levels of government, industry, and present and future benefits.

The methods and studies of measuring pollution are important, of course, but not nearly so crucial as the prevention of pollution in the first place.

This report is one of the most complete compilations of data relating to the overall view of the Lake Erie Basin that we have reviewed. In order to give the report more definite conclusions and recommendations, however, we suggest that pollution prevention and abatement be singled out as the area requiring a concentrated and continuing effort by all levels of government as well as industries within the Basin.

The criteria and methods of measurement should be refined as the program proceeds, but these items should not be the end product themselves.

I appreciate the opportunity to review your draft copy of "Water Oriented Outdoor Recreation in the Lake Erie Basin", and I look forward to receiving the final report.

Sincerely yours,

(Signature)
MAURICE K. GODDARD

P.S.: We are returning your report Water-Oriented Outdoor Recreation - Lake Erie Basin under separate cover.

1750 GUARDIAN BUILDING
Detroit, Michigan 48226
Area Code 313 - 961-5865

THE HURON CLINTON METROPOLITAN AUTHORITY

May 31, 1966 Commissioners

U. S. Department of the Interior
Bureau of Outdoor Recreation
3853 Research Park Drive
Ann Arbor, Michigan 48104

Attention: Roman H. Koenings, Regional Director

Gentlemen:

We appreciate your thoughtfulness in handing us copy No. 028 of the preliminary draft of report "Water Oriented Outdoor Recreation - Lake Erie Basin."

Contributing to the delay in replying to your request for our comments was the rather wide distribution given the report so that we might be as constructive as possible with our suggestions, if any. As no doubt with other agencies, we placed greatest emphasis on our district which is but a portion of Zone 1.

Among other benefits to be realized from such a report is the reference to the very obvious need for an effective program for pollution correction and abatement. Costs of such programs should be basin-wide as would be the benefits; otherwise little would be accomplished if such was attempted by sections or districts.

A very important answer is needed by us and perhaps by others which is--"Can we justify the high cost of acquiring and developing water-oriented recreational facilities on Great Lakes frontage within the basin if we are not confident water conditions will improve?"

This letter would be incomplete without an expression of appreciation to your office which has taken a "look" at an immense problem on a basin-wide basis rather than to sections or districts as we would be inclined to do.

Very truly yours,

(Signature)
Kenneth L. Hallenbeck
Director

KLH:bjj

C O P Y
SEAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Bureau of Sport Fisheries and Wildlife
1006 West Lake Street
Minneapolis, Minnesota 55408

in reply refer to:

RB

April 28, 1966

MEMORANDUM

To: Regional Director, Bureau of Outdoor Recreation, USDI
Ann Arbor, Michigan

From: Regional Director, Bureau of Sport Fisheries & Wildlife,
USDI, Mpls., Minn.

Subject: Review of Preliminary Draft, Lake Erie Report

We appreciate the opportunity to review and comment on the subject report. We concur generally in the comments and conclusions reached in your report and find it to be a well-written document. Thank you for this review opportunity.

(Signature)
R. W. Burwell

Attachment - Two draft reports

COPY

UNITED STATES GOVERNMENT
MEMORANDUM

To :Regional Director, Lake Central Region, BOR Date: June 2, 1966
Ann Arbor, Michigan

From :River Basin Studies Coordinator, BCF
Ann Arbor, Michigan

Subject:Preliminary draft report "Water Oriented Outdoor Recreation -- Lake Erie Basin"

Reference is made to the subject report and accompanying cover letter dated May 20, 1966. Accordingly, we are forwarding the following comments.

We noted a minor error on page 7-3 in the "Proposed and Potential Recreation Areas" section. In the last paragraph reference is made to Plate No. 6-3, the location of porposed harbors. Inspection of Plate No. 6-3, however, reveals several photographs on recreational boating. Actually, Plate No. 6-5 on page 6-16 shows the harbors in question.

We appreciate the opportunity to review and comment on this excellent report.

(Signature)
Robert L. Schueler

COPY
SEAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF THE SECRETARY
UPPER MISSISSIPPI-WESTERN GREAT LAKES AREA
303 Price Place
Madison, Wisconsin 53705

Memorandum

June 17, 1966

To: Mr. Roman Koenings, Regional Director, BOR, Ann Arbor

From: Regional Coordinator, UMWGLA

Subject: Lake Erie Report

I made a quick review and liked this report.

In general, I would like to see your section on "Needs and Goals" strengthened, and more specific, hard-hitting recommendations made regarding Lake Erie and needed solutions.

On page 6-11, line 20, you might wish to indicate that BOR is working with the Corps and the IJC on the Water Level Reference. On page 6-8, line 11, and at other places in the report, mention is made that existing areas should be developed. Although this may be true, I am wondering if priorities would indicate a larger expenditure at this time on land acquisition for outdoor recreation.

On page 6-28, line 20, some suggestions on how the private and public sector will satisfy demands might be in order. Specifically, that portion of the demands can be met by the private sector, and in what way?

On page 8-11, line 35, I believe too much emphasis is given to zoning. I think it provides one technique for land use control that has to be used in conjunction with tax policy, eminent domain (easements), official maps, plat review, etc.

The large foldout map I think could be reduced to standard size, which would make for easier reference. The "Forward," I think should also be directed more specifically to Lake Erie, although I like the quotes. Acknowledgements take a lot of space, so why not put them in the Appendix?

I hope these comments are of some use. I am returning the report as you requested.

(Signature)
HAROLD C. JORDAHL, JR.

Enclosure

COPY
SEAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF THE SECRETARY
Federal Office Building
550 Main Street
Cincinnati, Ohio 45202

Your ref:
D6427GL

June 2, 1966

Memorandum

To: Regional Director, Lake Central Region, BOR

From: Regional Coordinator, Ohio River-Appalachian Area

Subject: Preliminary draft report, "Water-Oriented Outdoor Recreation - Lake Erie Basin"

After perusing the subject report, I find it quite interesting and informative.

I hear by the grapevine that Vice-President Humphrey has made the statement that a meeting is to be held in Cleveland, Ohio, in the near future to discuss the pollution problems existing in the Great Lakes. The data compiled in this report should be considered in formulating the agenda for such a meeting.

I will keep you informed on the developments toward the staging of such a meeting.

(Signature)
Fred Wampler

Encl.
Report

COPY
SEAL

DEPARTMENT OF THE ARMY
North Central Division, Corps of Engineers
536 South Clark Street
Chicago, Illinois 60605

IN REPLY REFER TO.
NCDED-C

27 May 1966

Mr. Roman H. Koenings, Regional Director
Lake Central Region
Bureau of Outdoor Recreation
3853 Research Park Drive
Ann Arbor, Michigan 48104

Dear Sir:

Returned as requested is the copy of preliminary draft of your report, "Water-Oriented Outdoor Recreation - Lake Erie Basin". The draft report has been reviewed and is considered adequate for the purposes stated. It is pointed out, however, that for other studies currently underway it is desirable that an evaluation be made, if possible, of recreation on Lake Erie and the other Great Lakes. (Reference is made in this connection to studies under the 7 October 1964 International Joint Commission Lake Levels Reference.) The International Great Lakes Levels Working Committee, meeting in Chicago, Illinois on 2 March 1966, was reminded of this need for evaluation in monetary terms of all components of shore property interests. Copy of draft minutes of the March meeting is inclosed for your information.

The opportunity to review your Lake Erie report is very much appreciated.

Sincerely yours,

(Signature)
J. S. King
Assistant Chief
Engineering Division

2 Incl
1. Draft Report
2. Minutes

C
O
P
Y
SEAL

DEPARTMENT OF THE ARMY
Buffalo District, Corps of Engineers
Foot of Bridge Street
Buffalo, New York 14207

IN REPLY REFER TO NCBED-B 25 May 1966

Regional Director
Bureau of Outdoor Recreation
Lake Central Region
3853 Research Park Drive
Ann Arbor, Michigan 48104

Dear Sir:

This is in reply to your letter of 14 April 1966 requesting comments on your preliminary report Water Oriented Outdoor Recreation-Lake Erie Basin.

The report has been reviewed, particularly with respect to matters pertinent to Corps activities in the area. Pencil notations have been made on page 6-17 of the draft indicating the following suggested revisions:

a. Delate footnote 2/ from item 39 Rocky River since some recently authorized improvements have not been completed;

b. Add Geneva-on-the-Lake, which is referred to in par. 9 on page 7-3 of the draft, as one of the areas being studied;

c. Sturgeon Point is the name generally used for locality No. 62.

The draft of the report, serial No. 018, furnished us for review is being returned herein, as requested.

Sincerely yours,

(Signature)
RALPH H. GALLINGER
Supervisory Civil Engineer
Acting Deputy District Engineer

1 Incl
as

COPY
SEAL

DEPARTMENT OF THE ARMY
Detroit District, Corps of Engineers
P.O. Box 1027
Detroit, Michigan 48231

IN REPLY REFER TO
NCEED-B

6 May 1966

Mr. Roman H. Koenings
Regional Director
Bureau of Outdoor Recreation
3853 Research Park Drive
Ann Arbor, Michigan 48104

Dear Mr. Koenings:

Thank you for the opportunity to review the preliminary draft of your report Water-Oriented Outdoor Recreation-Lake Erie Basin.

The report certainly seems to accomplish the stated purpose. We have no comments on the subject content.

Sincerely yours,

(Signature)
G. W. RESCHKE
Chief, Engineering Division

1 Incl.
Report

COPY

SEAL

DEPARTMENT OF THE ARMY
Lake Survey District, Corps of Engineers
630 Federal Building
Detroit, Michigan 48226

IN REPLY REFER TO:
NCLDE

3 June 1966

Mr. Roman H. Koenings, Regional Director
U. S. Department of the Interior
Bureau of Outdoor Recreation
Lake Central Region
3853 Research Park Drive
Ann Arbor, Michigan 48104

Dear Mr. Koenings:

Reference is made to your letters of 14 April and 20 May 1966, D 6427 GL, and to telephone conversation of 25 May between Messrs. Henley of your office and Kirshner of the Lake Survey relative to comments on the preliminary draft of the publication, "Water-Oriented Outdoor Recreation in the Lake Erie Basin." The Lake Survey's comments, keyed to page and line number of the draft publication, are as follows:

Page 3-2, line 29 - Table No. 3-1 should be revised to agree with land area shown on page 3-1, line 26, and with the recommendations for publishing drainage basin data of the Federal Inter-Agency River Basin Committee in its November 1951 Bulletin No. 4, Notes on Hydrologic Activities, Inter-Agency Coordination of Drainage Area Data. It is recommended therein that areas less than 1,000 square miles be rounded to the nearest square mile and larger areas to three significant digits. When large and small areas are combined and the total shown, it is recommended that a note explaining the arithmetic discrepancy be included. Following the recommendations, Table No. 3-1 could be shown:

The Lake Erie Basin

Total Basin Area (land and water) (US)	26,700 square miles
Lake Erie Water Area (US)	5,190 square miles
Basin Land Area (including 138 square miles of inland lake area) (US)	21,500 square miles

A similar treatment of the land area components in the table and addition of the note, "Total values do not necessarily equal the sum of the component parts due to rounding" are suggested. The attached tabulation illustrates the Lake Survey method of complying with the Inter-Agency recommendations.

Page 3-3, line 49 - The Lake Survey computes and publishes precipitation on the Great Lakes basin. According to the Lake Survey figures for the Lake Erie basin (Port Huron, Michigan, to Buffalo, New York) the average annual precipitation during the period 1900-1965 was about 34 inches (33.69) and varied from a high of 42.63 inches in 1950 to a low of 24.48 inches in 1963.

Page 3-5, line 10 - The Lake Survey has been making aerial observations of Great Lakes ice coverage since 1963. During the four winters of such observations it is to be noted that the maximum Lake Erie coverage was as follows:

Year	Coverage
1962-63	95 to 100 per cent covered during February.
1963-65	95 per cent covered at the middle of February.
1964-65	85 to 95 percent covered in February and March.
1965-66	85 percent covered at the end of February.

Page 3-5, line 18 - If this statement refers to all ice formation, the bays of Lake Superior freeze much earlier than Lake Erie.

Page 3-13, line 10 - The Lake Survey through the Coordinating Committee on Great Lakes Basic Hydraulic and Hydrologic Data in concert with appropriate Canadian agencies is in the process of coordinating certain physical data for the Great Lakes and their basins. The area of the Lake Erie water surface has been coordinated at 9910 square miles.

Page 3-13, line 16 - The mean depth of Lake Erie when the lake is at Low Water Datum, elevation 568.6 feet, International Great Lakes Datum (1955), currently published by the Lake Survey is 58 feet. This depth is being redetermined by the Coordinating Committee and preliminary indications are that the coordinated depth will be less than 2 feet greater than 58 feet.

Page 3-14, line 10 - Change "lunar" to "astronomical" as the range quoted refers to both lunar and solar tides.

Page 3-14, line 14 - Lake Survey records show an average seasonal fluctuation since 1860 of 1.5 feet, varying from a low of 0.5 foot in 1891 to a high of 2.7 feet in 1947.

Page 3-14, line 26 - Short period fluctuations of Lake Erie levels are due to wind and barometric disturbances as well as to seiches. Suggest rewording and rearranging starting line 26 as follows: ". . . Another factor to be considered in discussing fluctuation of the lake levels are the short period fluctuations due to wind and barometric disturbances and to seiches."

"Because of the lake's shallowness and also due to the prevailing wind lying in the direction of the lake's long axis, the short period fluctuations can be appreciable. Records show that on occasion differences in water level of as much as 13 feet have existed between Toledo, Ohio, and Buffalo, New York. Once the wind stops blowing or the atmospheric pressure changes, the water oscillates back and forth in the lake, thereby causing an alternating rise and fall of levels at the lake ends. These surface oscillations, which occur within a given time period, may be compared to water sloshing back and forth in a bathtub. With each swing there is a little less rise or fall until the lake returns to normal. A seich, which is indicated by a gradual rising or lowering of the water, may be observed more readily by watching the water level around piling, a dock, or a pier."

Page 3-15, line 22 - The figure 490 square miles includes 21 square miles of St. Clair River and 39 square miles of Detroit River. It should be changed to 430 square miles or foot-noted to this effect.

Page 3-15, line 26 - The navigation channel maintained "across Lake St. Clair" is 27.5 feet deep.

Page 3-15, line 37 - The length of Lake St. Clair shoreline is 98 miles, including 31 miles of island shoreline. (See also Table 3-3 on page 3-16.)

NCLDE 3 June 1966
Mr. Roman H. Koenings

Page 3-26, Table No. 3-5 - - See comments regarding page 3-2 and Table 3-1.

The copy of the preliminary draft of the report inclosed with your 14 April 1966 letter is returned herewith as requested therein. The stamping of the draft as being included in the Lake Survey Technical Library was inadvertent.

Sincerely yours,

(Signature)
LOUIS D. KIRSHNER
Chief Technical Assistant

2 Incl
1. Attachment
2. Draft Report

COPY

UNITED STATES DEPARTMENT OF AGRICULTURE
Forest Service
North Central Region
710 N. Sixth Street, Milwaukee, Wisconsin 53203

in reply refer to:
2340
April 28, 1966

Mr. Roman H. Koenings
Regional Director
Bureau of Outdoor Recreation
Lake Central Region
3853 Research Park Drive
Ann Arbor, Michigan 48104

Dear Mr. Koenings:

We appreciate the opportunity to review the preliminary draft of your report on Water Oriented Outdoor Recreation - Lake Erie Basin.

While we do not administer lands within the Lake Erie Basin, we do have several areas in adjacent watersheds, and the information on use, etc., will be of much value to us. We shall appreciate copies of the final report.

Sincerely yours,

GEORGE S. JAMES
Regional Forester

By: (Signature)

Enclosure

SEAL

COPY

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
Syracuse, New York 13210

April 25, 1966

Mr. Roman H. Koenings, Reg. Dir.
U.S. Dept. of the Interior
Bur. of Outdoor Recreation
Lake Central Region
3853 Research Park Dr.
Ann Arbor, Michigan 48104

Dear Mr. Koenings:

Thank you very much for the opportunity to review the Bureau of Outdoor Recreation's preliminary draft of a report of Water-Oriented Outdoor Recreation - Lake Erie Basin. My staff and I have studied this report and would like to commend your agency for making a thorough analysis of the situation in the Lake Erie Basin.

We have the following suggestions:

1. We hope to see a strong effort made for prompt action in putting into effect some of the most urgently needed acquisitions and developments suggested in your report.

2. We strongly recommend that some of the early acquisitions be those in the small watersheds which have good potential reservoir sites. If people in the basin can be motivated to act quickly, they may be able to save several potential reservoir sites which will give them excellent distribution of the recreation areas throughout the basin. These reservoirs also may very well be constructed as multi-purpose storage sites which can bring benefits to a broad segment of our population.

Thanks again for the opportunity to review your report. Again, let us hope that it leads to an early action program.

Sincerely yours,

(Signature)
Wallace L. Anderson
State Conservationist

COPY

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
311 Old Federal Building
Columbus, Ohio 43215

April 26, 1966

Your reference:
D6427GL

Roman H. Koenings, Regional Director
Bureau of Outdoor Recreation
Lake Central Region
3853 Research Park Drive
Ann Arbor, Michigan 48104

Dear Mr. Koenings:

As requested in your letter of April 14, we are returning copy of the preliminary report for Water-Oriented Outdoor Recreation - Lake Erie Basin.

We very much appreciate having the opportunity to review this report. It really emphasizes the need for additional outdoor recreation facilities, both public and private in this area.

Our responsibilities as an agency deal mainly with the private sector since we assist non-Federal landowners in the planning and establishment of recreation enterprises. We are receiving an ever-increasing number of requests for this type of assistance. Our experiences to date indicate the following reasons that more successful private recreation enterprises are not established:

1. The high degree of management required.

2. The inability, or unwillingness, or many landowners to secure sufficient capital to install a quality enterprise.

3. Lack of sufficient advertisements by operators of private recreation facilities.

We note that your report brought out the same findings.

We were interested in and fully concur in the finding that the character of the Lake Erie Basin visiting population is rather unique in that, to a large extent, it is for day-use purposes. We are of the opinion that if this area is to reach its potential in outdoor recreation, additional types of large recreation facilities are needed to attract people for longer than 1-day visits. This type of facility, in our opinion, would also be a stimulus to the development of additional private recreation enterprises.

We wondered about the statement on Page 4-9 that agricultural workers make up only 2½ per cent of the Basin's employment. We interpret this, that you are speaking strictly of the on-farm type of workers, since certainly agriculture and its related services account for a much larger percentage of employment.

Thanks again for a chance to review this report. We look forward to working and cooperating with you in any way possible.

Sincerely,

(Signature)
Raymond S. Brown
State Conservationist.

Enclsoure

COPY

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
100 North Cameron Street
Harrisburg, Pennsylvania 17101

May 16, 1966

Roman H. Koenings, Regional Director
Bureau of Outdoor Recreation
Department of the Interior
3853 Research Park Drive
Ann Arbor, Michigan 48104

Dear Mr. Koenings:

The enclosed preliminary draft of the report entitled "Water Oriented Outdoor Recreation - Lake Erie Basin" was reviewed by this office. The following are some general comments:

> This report contains excellent factual information on the above subject. Because the narrative is easily readable and contains useful tables, together with plates and photographs on recreation, it could provide a very useful working tool to recreation planners in the counties within the Basin, as well as in the "zone of influence" surrounding the Basin.
>
> Perhaps a little more can be said about artificial impoundments -- in particular -- recreation ponds. The Soil Conservation Service field office in each county within the Basin may be able to provide you with more information on approximate pond numbers and water surface areas that may be of value to the overall survey.
>
> Finally, it was stated in the report that there are numerous wildlife areas that have very little development at present. Maybe a plate containing locations of such areas would have merit -- particularly areas that offer potential waterfowl habitat.

Sincerely,

(Signature)
R. M. Davis
for
Ivan McKeever
State Conservationist

Enclosure

COPY

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
1405 S. Harrison Rd. R. 101
East Lansing, Michigan 48823

May 13, 1966

Roman H. Koenings, Regional Director
Department of the Interior
Bureau of Outdoor Recreation
3853 Research Park Drive
Ann Arbor, Michigan 48104

Dear Mr. Koenings:

The enclosed copy of the preliminary draft of the report Water-Oriented Outdoor Recreation - Lake Erie Basin is being returned as requested.

I very much appreciate having had the opportunity to review and comment on the contents of this report.

The section referring to private recreation development, which mentioned that the private sector would remain an important asset in the provision of outdoor recreation opportunity, was of interest to me.

The detailed inventory of private outdoor recreation enterprises, made by Michigan Soil Conservation Districts, has been completed and summarized by Dr. Emmanuel T. VanNierop, State Soil Conservation Committee. It may now be possible to obtain additional information, previously not available, which could support the private development part of the report.

Yours very truly,

(Signature)
Verne M. Bathurst
State Conservationist

COPY

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
311 West Washington Street, Room 212
Indianapolis, Indiana 46204

Refer: D6427GL

April 22, 1966

Mr. Roman H. Koenings
Regional Director
Bureau of Outdoor Recreation
3853 Research Park Drive
Ann Arbor, Michigan 48104

Dear Roman:

We have reviewed the enclosed preliminary draft of the report on Water-Oriented Outdoor Recreation in the Lake Erie Basin. The report is very complete and presents an excellent summary of water oriented recreation in the Lake Erie basin.

Perhaps the "hunting" phase could be expanded. As an example, were the Lake Erie Waterfowl hunting marshes in Ohio considered?

We appreciate the opportunity to review this report. It certainly is a needed publication.

Sincerely yours,

(Signature)
Kenneth E. Grant
State Conservationist

Enclosure

APPENDIX D

Methodology

APPENDIX D

METHODOLOGY

A. Methodology for Estimating Demand for Recreational Opportunities in the Lake Erie Basin

Basin Demand

The first step in determination of the present recreation demand involved calculation of the population on which to base estimates. All Standard Metropolitan Statistical Areas (SMSA's) inside the basin, as well as those within 125 miles of the basin were determined, along with their populations.

From information contained in the California Outdoor Recreation Study, ORRRC Report No. 4, and the report on the Comprehensive Survey of the Water Resources of the Delaware River Basin, Appendix I, it was concluded that:

1. Sixty percent of all recreation occurs within 40 miles of the participant's home.
2. Another thirty percent occurs between 40 and 125 miles of the particpant's home.
3. Ten percent of all use occurs at distances greater than 125 miles.

Therefore, it was assumed that 60 percent of the population of each SMSA will recreate within a 40 mile radius of the center of it. Likewise, 30 percent of the population of each SMSA was assumed to recreate between 40 and 125 miles of the center of the SMSA. It was further assumed that recreation emanating from an SMSA will spread equally throughout each of the zones encircling it. In order to determine that portion of the population which will affect recreation within the basin, circles with 40 and 125 miles radii were drawn around these SMSA's and the percentage of each circle which fell within the Lake Erie Basin was determined by planimeter. This percentage was then multiplied by the portion of the SMSA population represented by the circle. The resultant figures, when added to the total non-SMSA population within the basin, represents the population on which the demand estimates are based, in other words, an "effective" population.

In the planimetering process, water as well as land area was included. It was assumed that when a natural barrier such as Lake Erie was encountered, people would spread with greater intensity along the barrier, in this case, the shoreline.

Participation rates for selected outdoor recreation activities were determined from ORRRC Report No. 19, Tables No. 1.01, 2.01, 3.01 and 4.01. These rates were adjusted to the basin by multiplying them by the ratio of basin per capita income to North Central Census Region per capita income. This adjustment was made to reflect more localized conditions in rates of participation in the various outdoor recreation activities. The ratio of basin per capita income to North Central Census Region per capita income is used as a basis of adjustment since per capita demand bears close relationship to a person's available income. (Reference is made to ORRRC Study Report No. 26, p. 31) The North Central Census Region 1960 per capita income of $2,228 was divided into the 1960 basin per capita income of $2,374 to obtain the factor of 1.065 used to adjust the participation rates to local conditions. See Table No. 5-2. The population influencing recreation participation as previously determined is multiplied by the adjusted participation rates to yield activity days of participation. This then, becomes current recreation demand by activity as shown on the same table.

While the majority of the people living in the market area are reflected in the effective population previously determined, it is realized the non-SMSA people outside the basin but within the 125 mile zone of the basin are not. It was assumed that the number of non-SMSA people outside the basin who influence recreation within it would be cancelled out by the non-SMSA people inside the basin who do not influence the basin recreational activity.

One other group not reflected in the determination of the effective population are those who come into the basin from distances greater than 125 miles for extended vacations. No valid method of including this portion of the recreation activity could be determined, however, it is felt that it is significant. Therefore, the activity days as determined for the various activities are considered conservative.

Zone Demands

The method presented below was used to provide a zone breakdown of demands in response to the specific request for such information. This method will provide activity days of demand for the three zones in the Lake Erie Basin using an income index. The demands are given as if each zone were under separate study, that is, the income indexes are used to modify a participation rate which was then multiplied by the respective zone populations as was done with respect to the determination of basin demand.

The respective zone population was used instead of an "effective" population due to lack of time, but it was felt that this was acceptable as it is only to provide an index, or indication of a zone breakdown of the basin demand.

Since a basin demand figure has been previously determined, this figure is the limiting factor, and the zone breakdown will be expressed only as a precentage of this basin total figure.

Information from the County-City Data Book 124/ was used to derive the percent of the families within the basin whose income is less than $3,000 per year. Also, for each zone the percent of families that earn less than $3,000 annually was computed.

This yielded:

Zone 1	11.7%
Zone 2	22.3%
Zone 3	9.1%
Basin	13.9%

To calculate the zone indexes, the reciprocals of these percentages were multiplied by 100 and then divided by the basin figure.

$$\text{Zone 1} \quad \frac{1}{11.7} \quad \text{X} \quad 100 = 8.5 \qquad \frac{8.5}{7.1} = 1.19$$

$$\text{Zone 2} \quad \frac{1}{22.3} \quad \text{X} \quad 100 = 4.4 \qquad \frac{4.4}{7.1} = .61$$

$$\text{Zone 3} \quad \frac{1}{9.1} \quad \text{X} \quad 100 = 10.9 \qquad \frac{10.9}{7.1} = 1.53$$

$$\text{Basin} \quad \frac{1}{13.9} \quad \text{X} \quad 100 = 7.1$$

(The reciprocals were necessary in this case due to the inverse relationship that exists, that is, the higher the percentage of families making less than $3,000, the lower the participation to be expected from that county. Reciprocals would not be used if a direct, or positive, relationship existed.)

The average of the three zone indexes becomes the basin index.

$$1.19 + .61 + 1.53 = 3.33 \qquad \frac{3.33}{3} = 1.11 = \text{basin index}$$

The zone indexes are then expressed as a percent of the basin index. (The basin index = 100 percent).

$$\text{Zone 1} \qquad \frac{1.19}{1.11} = 107\%$$

$$\text{Zone 2} \qquad \frac{.61}{1.11} = 55\%$$

$$\text{Zone 3} \qquad \frac{1.53}{1.11} = 138\%$$

The basin participation rate is 29.01 (see table No. 5-2). This basin rate is then multiplied by the above percentages to yield the zone participation rates.

Basin = 100% = 29.01
Zone 1 = 107% = 31.04
Zone 2 = 55% = 15.96
Zone 3 = 138% = 40.03

These rates are then multiplied by the respective zone populations to yield the zone demands.

Zone 1 31.04 x 4,400,000 = 136,576,000
Zone 2 15.96 x 1,000,000 = 15,960,000
Zone 3 40.03 x 4,400,000 = 176,132,000

The discrepancy between the basin total figure as previously determined and the sum of the three zone figures is, again, due to the different use of the population figures. But for the provision of an indication of a zone breakdown, this was considered acceptable.

The zone figures above were then expressed as a percentage of their total and these percents applied to the previously determined basin figure.

Basin = 100% = 245,351,000 activity days
Zone 1 = 42% = 103,047,000 activity days
Zone 2 = 5% = 12,268,000 activity days
Zone 3 = 53% = 130,036,000 activity days

Future demands on a zone basis were caluclated by using the same percentages as above with the basin demand figure again being the limiting figure.

B. Method for Determining Acreage Needs

This method is based on land area per person standards as determined by personnel in the Lake Central Office, Bureau of Outdoor Recreation. These standards were arrived at by compilation of existing information from many sources. They are not to be considered as official Bureau standards.

As stated in the body of the report, the acreage needs are determined in order to support anticipated visitation on those days when maximum use occurs. This was determined as follows:

14 week summer season = 98 days
28 weekend days plus 2 holidays = 30 days
Weekdays = 68 days

Assume three weekdays of use equals one weekend day of use. 23 + 30 = 53 capacity days

For the activity of swimming, which is curtailed by inclement weather, assume 80 percent of capacity days will be suitable. Therefore, assume 42 capacity days for swimming.

Land area per person standards as presented below include all development necessary to support one person engaging in the respective activity. The activities of swimming, fishing, boating and picnicking are those under consideration as it was concluded that these constitute the basically desired, intensive-use activities that should be provided for wherever possible. These acreages, are adjusted later to provide for additional activities of an extensive-use nature.

Swimming

Assume:
1. 4 people/car
2. 48 cars parking/acre (National Park Service) (910 sq. ft./car, or 227 sq. ft./person)
3. 75 sq. ft. beach/person
4. Turnover factor of 1.5

Fishing

Assume:
1. 2 people/car and boat
2. 1,633 sq. ft. parking/car and trailer including ramp facilities
3. Turnover factor of 1.5

Boating

Assume:
1. 3 people/car and boat
2. 1,633 sq. ft. parking/car and trailer including ramp facilities
3. Turnover factor of 2

Picnicking

Assume:
1. 4 people/car
2. 10 picnic tables/acre, including parking
3. Turnover factor of 1.5

This information is then applied to the formula below to arrive at necessary supporting acreage.

$$AR = \frac{D \times a}{CD \times TF \times 43{,}560}$$

Where: AR = acreage requirement
D = demand for respective activity in summer activity days
a = area per person in square feet for respective facilities
CD = capacity days
TF = turnover factor
43,560 = square feet per acre

Present Acreage Needs

The sum of the four acreage requirements yields the developed acreages necessary for the provision of adequate opportunity for these basic activities. This then is considered as the minimum acceptable amount of developed land to be provided in the basin (or zone). From this, the total existing developed acreages were subtracted which left that amount of developed land yet needed. (Existing development figures were obtained from Form BOR 8-73 of the recent Nationwide planning effort.)

In order to expand the deficit of developed acreage into total acreage needed, deficit of developed acreage figures were multiplied by four. The multiplier of four represents an average development factor for intermediate and user-oriented type areas. That is, optimum development for intermediate type areas is considered to be 15 percent, and that for user-oriented areas is considered to be 70 percent.

$$\frac{100}{15} = 6.7 \qquad \frac{100}{70} = 1.4$$

The average of the above two factors is four.

These total acreages are presented in the right column under "Total Needed Acreage" in Table No. 8-1. They represent average figures which should be adjusted after a more detailed study. If the more detailed study finds that user-oriented areas are needed more than the intermediate type, the needed total acreage would be lowered, and if the reverse was true, the figure would be raised.

Acreage Needs: 2020

The same factors as before were considered in this determination, except that the 2020 "With opportunity" demand figures were used. A major difference exists, however, in the calculation of the "Needed" acreage deficit. That is, instead of using the multiplier of four, a multiplier of two was used. This assumes that desirable development levels will tend to approach that presently accepted for user-oriented areas.

Developed acreage figures were not presented in Table No. 8-2 because of the lack of necessary information for proposed lands.